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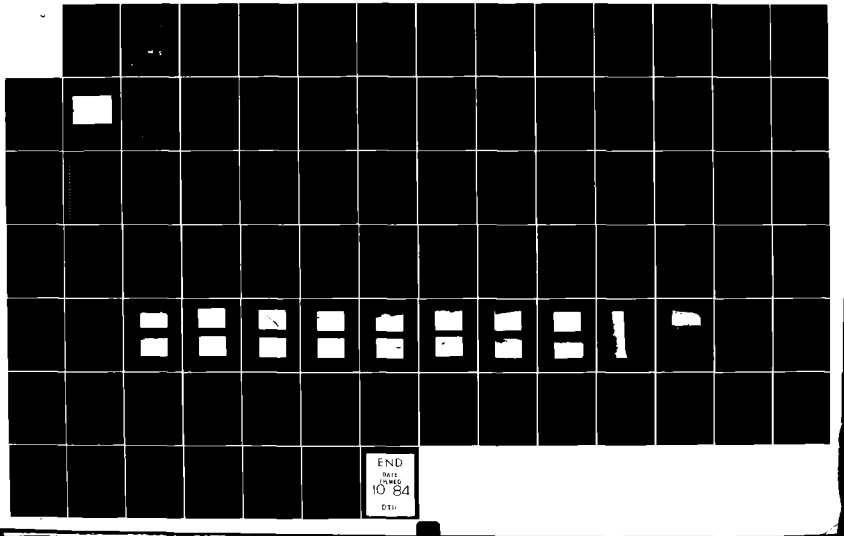

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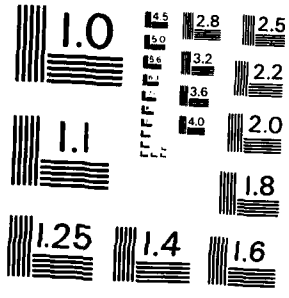

CONNECTICUT COASTAL

WALLINGFORD, CONNECTICUT

PISTAPAUG POND DAM
CT 00034

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS. 02154

APRIL 1981

UNCLASSIFIED

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Conn. Coastal Wallingford, Conn.
Pistapaug Pond Dam

20 ABSTRACT (Continue on reverse side if necessary and identify by block number)

Pistapaug Pond Dam is an earthen embankment dam with a concrete core wall. The dam is 9.2 ft. high, 17 ft. wide at the crest and approx. 370 ft. long. There is a spillway with flashboards located near the middle of the dam. A gatehouse located on an embankment 100 ft. downstream of the dam controls discharges into the Wallingford Water Supply System. A 16-inch force main and open channel system coming from Ulbrich Reservoir supplies water to Pistapaug Pond. The reservoir is used for water supply purposes and ahs a maximum storage capacity fo 4540 acre-feet with water at the top of dam.

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DEPARTMENT OF THE ARMY

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Pistapaug Pond Dam (CT-00034) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important part.

Copies of this report have been forwarded to the Department of Environmental Protection, and to the owner, City of Wallingford, Wallingford, CT. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Protection for your cooperation in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

PISTAPAUG POND DAM
CT 00034

CONNECTICUT COASTAL
WALLINGFORD, CONNECTICUT

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

LETTER OF TRANSMITTAL

FROM THE CORPS OF ENGINEERS TO THE STATE

TO BE SUPPLIED BY THE CORPS OF ENGINEERS

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.	:	CT 00034
Name of Dam	:	Pistapaug Pond Dam
Town	:	Wallingford
County and State	:	New Haven County, Connecticut
Stream	:	Farm River
Date of Inspection	:	November 24, 1980

BRIEF ASSESSMENT

Pistapaug Pond Dam is an earthen embankment dam with a concrete core wall. The dam is 9.2 feet high, 17 feet wide at the crest and approximately 370 feet long. There is a spillway with flashboards located near the middle of the dam. A gatehouse located on an embankment 100 feet downstream of the dam controls discharges into the Wallingford Water Supply System. A 16-inch force main and open channel system coming from Ulbrich Reservoir supplies water to Pistapaug Pond. The reservoir is used for water supply purposes and has a maximum storage capacity of 4540 acre-feet with water at the top of dam.

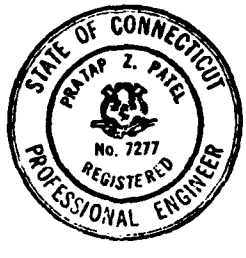
The visual inspection of Pistapaug Pond Dam indicated that the dam is in fair condition. The inspection revealed that the dam had some minor erosion at the downstream toe adjacent to the left spillway training wall as illustrated in Photo No. 15. The spillway weir and training walls were spalling and effloresecing in a number of places as shown in Photo No. 13. In addition, the downstream spillway apron was clogged with weeds and brush and lacks riprap protection. Also, there is lack of an adequate spillway channel. The upstream slope of the dam exhibited irregular riprap protection. Minor settlement on the crest of the dam occurred at Station 1 + 90 and Station 3 + 25 (the left abutment is taken as Station 0 + 00). The gatehouse, although posing no structural hazard to the dam, was found to be in poor condition, with some cracking and effloresecing, extensive flaking of roofing

material, and vine growth covering the outside of the building. Several small animal burrows were observed on the downstream slope and toe of the dam. Due to the low reservoir water level on the date of inspection, the dam could not be effectively inspected for seepage at the downstream toe.

Based on the intermediate size of the dam and its high hazard classification in accordance with the Corps Guidelines the test flood selected was the Probable Maximum Flood. Based on a drainage area of 0.5 square miles and using a peak inflow value of 2250 cfs/sq. mi. from the "rolling terrain' curve, the test flood peak inflow is estimated to be 1125 cfs. After following the Corps Guidance for routing flood flows through reservoirs it was determined that the entire flood volume would be contained in the pond. This assumes that the pond was at its normal level (elev. 388.0 NGVD) at the start of the flood and that the flash-boards were in place. Under these conditions there would be 0.5 feet of freeboard at the end of the storm.

Based on the visual inspection and hydrologic and hydraulic analysis there is some need for additional engineering input, analysis and design. This would include designing a proper sized spillway discharge channel and apron, designing repairs to the riprap protection on the upstream slope, designing necessary repairs to concrete spalling and efflorescence of spillway weir and training walls, including erosion of the left training wall, removing stumps from the downstream end of the right training wall of the spillway and replacing with compacted soil, and monitoring for evidence of seepage problems at higher reservoir levels. In addition, the owner should develop an annual technical inspection program along with an emergency surveillance and operations plan.

The recommendations and remedial measures are described in Section 7 and should be addressed by the owner within one year after receipt of this Phase I Inspection Report.



Pratap Z. Patel, P.E.
Project Manager
Pratap Z Patel
Philip W. Genovese & Associates, Inc.
Hamden, Connecticut

This Phase I Inspection Report on Pistapaug Pond Dam (CT-00034) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

JOSEPH W. FINEGAN, JR., CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at

some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

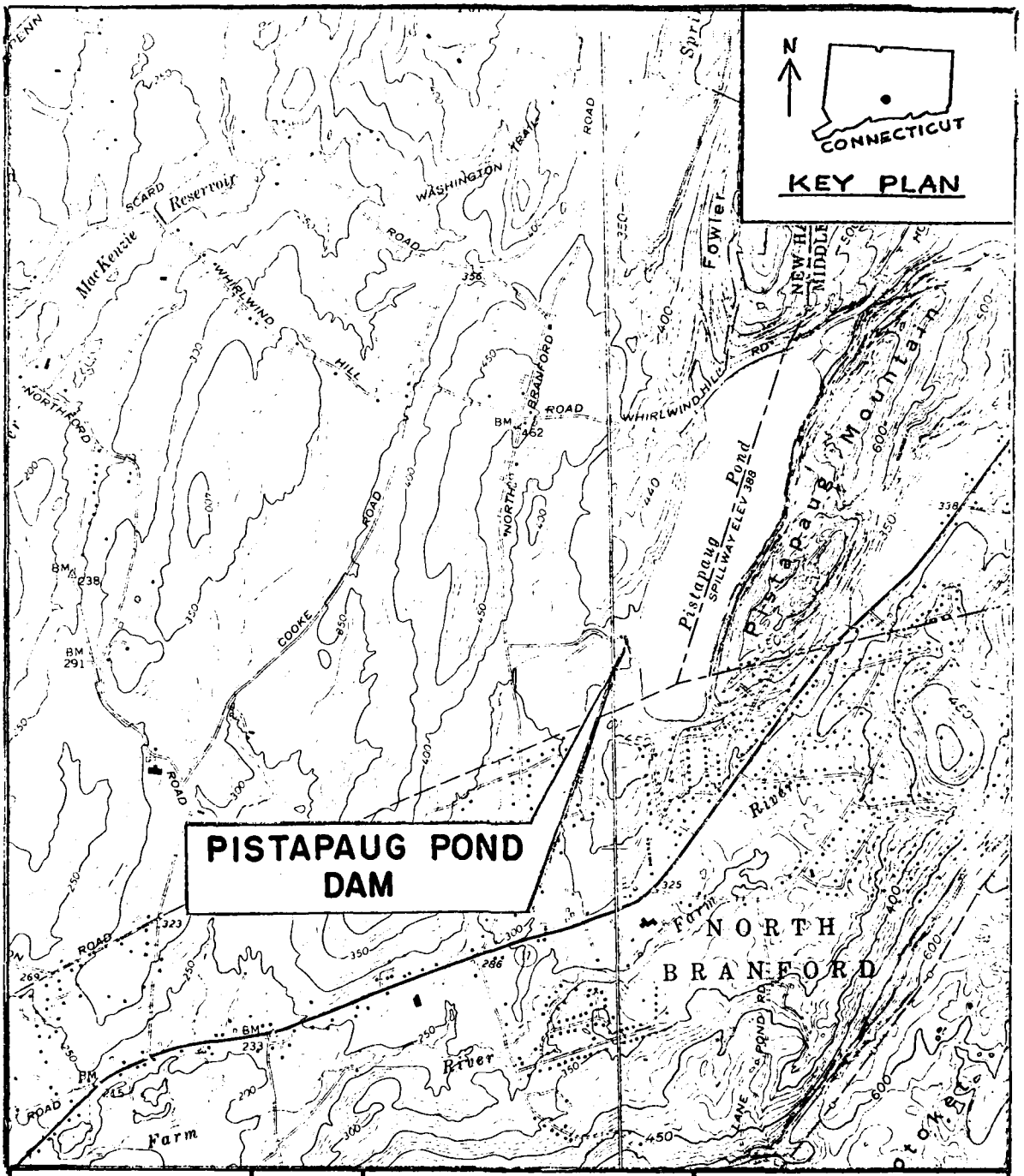
Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flodd provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

TABLE OF CONTENTS

APPENDIXES

U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	OVERVIEW PHOTO DECEMBER, 1980 PISTAPAUG POND DAM FARM RIVER WALLINGFORD, CONNECTICUT
PHILIP W. GENOVESE AND ASSOCIATES, INC. ENGINEERS - HAMDEN, CT.		



USGS QUAD WALLINGFORD, CT. DURHAM, CT.	N	PHILIP W. GENOVESE AND ASSOCIATES, INC. ENGINEERS-HAMDEN, CT.	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.
SCALE IN FEET 0 1000 2000 3000 4000		NATIONAL PROGRAM OF INSPECTION OF NON – FED DAMS LOCATION MAP	

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

PISTAPAUG POND DAM - CT 00034

SECTION I

PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Philip W. Genovese & Associates, Inc. has been retained by the New England Division to inspect and report on selected dams in South Central Connecticut. Authorization and notice to proceed were issued to Philip W. Genovese and Associates, Inc. under a letter of November 17, 1980 from Colonel William E. Hodgson Jr., Corps of Engineers. Contract No. DACW 33-81-C-0017 has been assigned by the Corps of Engineers for this work.

b. Purpose

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.

2. Encourage and prepare the states to initiate quickly effective dam safety programs for non-federal dams.

3. Update, verify, and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

Pistapaug Pond Dam is located in the City of Wallingford in New Haven County, Connecticut. The pond is partly in the Town of Wallingford and partly in the Town of Durham in Middlesex County, Connecticut. The dam, located north of Connecticut

Route 17, impounds the waters of Farm River, and is shown on the Durham, Connecticut Quadrangle with the approximate coordinates of North 41° 25.5', West 72° 45.0'.

b. Description of Dam and Appurtenances

Pistapaug Pond Dam consists of an earthen embankment dam with a concrete core wall. It is approximately 370 feet long including a 20 foot long spillway. The maximum structural height of the dam is 9.2 feet. Upstream and downstream slope of earthen embankment is 1 vertical to 2.2 horizontal.

Appurtenant structures consist of a concrete spillway, outlet works channel, three gatehouses and a service/storage shed. The spillway consists of a 20 foot long broad crested weir with wooden flashboards and concrete training walls.

The outlet works consist of an approach channel with a screened intake and concrete training walls which connect to a 24 inch cast iron pipe. (See Pages B-2 and C-1). This pipe which is controlled by a gate valve on the upstream slope of the dam is connected to the only operable gatehouse (No. 3) which connects to the Wallingford Water Supply System. There is also an ungated 18 inch outlet pipe that enters the same gatehouse from the center of the reservoir. Within the gatehouse there is an 8 inch drain pipe outletting from each of the two channels. (See Page B-3).

There is also a 16-inch force main and open channel system which supplies water to this reservoir from Ulbrich Reservoir (See Page B-5).

There are three gatehouses, which were constructed in 1882, 1892 and 1941 respectively. These gatehouses are identified as Nos. 1 (1882), 2 (1892), and 3 (1941) on the Photo Location Plan in Appendix C. (Page C-1). They are all concrete structures located on an embankment approximately 100 feet downstream of the dam. The only accessible, operable gatehouse, as reported by the owner, is the one constructed in 1941. (No. 3 on Photo Location Plan Appendix C - Page C-1). Basically, it consists of a 21 foot by 24 foot 8 inch concrete house with two 6 foot wide channels with screens and associated gate valves. Plans of this structure are shown in Appendix B (Page B-3).

The plan of the dam and its appurtenant structures is shown on Page B-1. Photographs of each structure are shown in Appendix C. Sketches of the dam and its appurtenances are in Appendix D.

c. Size Classification

The dam's maximum impoundment of 4542 acre-feet and height of 9 feet places it in the INTERMEDIATE size category, using as a reference the size classification table in the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams. Table one of these guidelines classifies a dam with 1000 to 50,000 acre-feet of storage as being intermediate in size.

d. Hazard Classification

The hazard potential classification for this dam is HIGH, using the Corps Guidelines, because of the presence of 4 houses within one mile of the dam which would experience 2 to 3 feet of flooding as a result of a dam breach, with the possible loss of more than a few lives. A dam breach would result in a ponding and flooding condition in back of a 6 foot by 10 foot box culvert at Route #17, and probably wash out a section of the road.

e. Ownership

The dam is owned by the City of Wallingford, Connecticut. The address is:

City of Wallingford
c/o Engineering Department
Town Farms Road
Wallingford, Connecticut 06492

Telephone: 203-269-8708

f. Operator

The operation of the dam is controlled by the Water and Sewer Department of the City of Wallingford, Town Farms Road, Wallingford, Connecticut. The Water and Sewer Authority Manager is Alfred Bruno, and the Authority's telephone number is 203-269-8795.

g. Purpose of the Dam

The purpose of the dam is for water supply for the City of Wallingford, Connecticut.

h. Design and Construction History

Constructions plans indicate that the original dam at this site was an earthen one with an elevation of 386.99. That along with the original gatehouse was constructed in 1882. A second gatehouse was constructed in 1892. In 1911 that dam was raised to elevation 389.50 with the addition of a concrete core wall and placement of additional earth. In 1941 the present dam was constructed by placing additional earth to an elevation of 394.50. At the same time a new spillway and spillway apron were constructed of concrete, steel and masonry and the last of the gatehouses was constructed. The plans for the gatehouse improvements are stamped by the firm of Clarence M. Blair, Inc. of New Haven, Connecticut. The 1941 dam plans are listed as being revised by William A. Mackenzie, C.E. Both plans are included in Appendix B.

i. Normal Operational Procedures

No data was disclosed for maintenance of reservoir water levels other than the water company's general policy to maintain as much water in their reservoirs as possible.

1.3 Pertinent Data

a. Drainage Area

The drainage area of Pistapaug Pond Dam is 0.50 square miles, or 320 acres. Almost half of this, or 145 acres, is the reservoir area itself. The remaining area is steeply wooded. Much of the area is owned by the Wallingford Water Company and hence there are only a few houses in the drainage area. One road, Whirlwind Hill Road, crosses the northwestern portion of the drainage area.

b. Discharge at Damsite

1. The outlet works for the reservoir consist of a 24 inch and an 18 inch intake line to the service gate chamber at elevation 368.6. Water from the service gate chamber is discharged to the two 24 inch gated outlet pipes at elevation 370.0. These two lines become one 24 inch pipe approximately five feet outside the gate-

house. There are two 8 inch drain lines exiting from the gatehouse at elevation 368.5. The discharge capacity for the outlet works is approximately 158 cfs with water at normal pool level.

2. Reservoir level readings are kept by the Wallingford Water Department. The highest water levels they have recorded is 391.9 reached on two occasions, June 1974 and March 1977. This would indicate no spillway discharge with the flashboards in place.

3. The spillway capacity with a water surface at the top of dam elevation of 394.5 would be approximately 325 cfs with the flashboards in place and 780 cfs with the flashboards taken out.

4. The ungated spillway capacity at test flood elevation of 391.1 is 120 cfs.

5. The gated spillway capacity at normal pool elevation of 388.0 is 0 cfs.

6. The gated spillway capacity at test flood elevation of 391.5 is 0 cfs.

7. The total spillway capacity at test flood elevation of 391.5 is 0 cfs.

8. The total project discharge at top of dam elevation of 394.5 is 499 cfs.

9. The total project discharge at test flood elevation of 391.5 is 174 cfs.

c. Elevation (Feet above NGVD)

1.	Streambed at toe of dam	385.3
2.	Bottom of cutoff	Unknown
3.	Maximum tailwater	Unknown
4.	Normal pool	388.0
5.	Full flood control pool	N/A
6.	Spillway crest	389.5 without Flashboards 391.9 with Flashboards

7. Design surcharge ..... Not Known
8. Top of dam 394.5
9. Test flood surcharge 391.5

d. Reservoir (Length in feet)

1. Normal Pool 5400
2. Test flood pool 6500
3. Flood control Pool ..... N/A
4. Top of dam 6500
5. Spillway crest pool 6500

e. Storage (Acre-feet)

1. Normal pool 3600
2. Spillway crest pool ..... 3817 without Flashboards 4165 with Flashboards
3. Flood control pool ..... N/A
4. Top of dam 4540
5. Test flood pool 4165

f. Reservoir Surface (Acres)

1. Normal pool 128
2. Flood control pool ..... N/A
3. Spillway crest pool ..... 139 without Flashboards 146 with Flashboards
4. Test flood pool 149
5. Top of dam 151

g. Dam

1. Type ..... Earthen embankment with concrete core wall
2. Length ..... 370 feet
3. Height ..... 9.2 feet
4. Top Width ..... 17 feet
5. Side slopes ..... Upstream Downstream (1 vertical to 2.2 horizontal

6. Zoning	Unknown
7. Impervious core	Plans show concrete core wall 3 feet 6 inches thick
8. Cutoff	2 inch matched sheeting hemlock
9. Grout curtain	Unknown

h. Diversion and Regulating Tunnel

16-inch force main and open channel entering from Ulbrich Reservoir

i. Spillway

1. Type	Concrete broad crested weir with wooden flashboards
2. Length of weir	20 feet
3. Crest elevation	389.5 without Flashboards 391.9 with Flashboards
4. Gates	None
5. Upstream channel	Not Observable
6. Downstream channel (and reinforcing)	Plans show stone, presently covered with weeds

j. Regulating Outlets

1. Invert	383.5
2. Size	24-inch 18-inch
3. Description	The reservoir can be drained by a 24-inch pipe which is set at elevation 383.5 or the 18-inch pipe originating in the center of the reservoir at an unknown elevation
4. Control mechanism	Valves located in the gatehouse and at the inlet structure for the 24-inch
5. Other	Two 8-inch drains with control valves located in the gatehouse

SECTION 2

ENGINEERING DATA

2.1 Design Data

This dam was constructed in 1882 for water supply purposes. Two drawings dated 1941 and bearing the name William C. Mackenzie, C.E. show plan and cross sections through the dam. In addition, there is a drawing of the 1941 gatehouse done by Clarence M. Blair, Inc. which is included in Appendix B. The Wallingford Water and Sewer Department supplied information on the size and impounding capacities of the reservoir.

2.2 Construction Data

No construction records were available for use in evaluating the dam.

2.3 Operation Data

No engineering operational data were disclosed.

2.4 Evaluation of Data

a. Availability

In addition to the plans and drawings mentioned above there is information available at the Wallingford Water and Sewer Department on reservoir levels, watershed boundaries and other not directly related material.

b. Adequacy

The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance history and sound engineering judgment.

c. Validity

The field investigation indicated that the external features of Pistapaug Pond Dam substantially agree with those on the available plans.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General

The field inspection of Pistapaug Pond Dam was initially made on November 24, 1980 with a follow up visit on January 20, 1981. The inspection team consisted of personnel from Philip W. Genovese & Associates, Inc. and Geotechnical Engineers, Inc. Mr. Alfred Bruno, who is the superintendent of the Wallingford Water and Sewer Department, was present at the latter inspection. Inspection check-lists, completed during the visual inspection are included in Appendix A. At the time of the inspection, the water level was approximately 2.4 feet lower than the spillway crest. The upstream face of the dam could only be inspected above this water level.

b. Dam

The dam is an earth embankment dam 9.2 feet high, approximately 370 feet long and 17 feet wide at the crest. At the location of the maintenance building, approximately 70 feet left of the right abutment, the crest locally narrows to a width of 12 feet (Photo No. 9). The dam appears to contain a concrete core wall about 9 inches wide at the crest. A stationing system was developed for the visual inspection. The junction of the crest of the dam and the left abutment corresponds to Station 0+00, and the station numbers increase to the right of this point. A 20 foot long concrete overflow spillway is located between Station 1+65 and Station 1+85 on the dam. A 24 inch wide operable intake sluice gate to a pipe passing through the dam to a gatehouse downstream from the dam is located right of the spillway at Station 1 + 90.

The upstream slope of the dam contains riprap protection extending to within 2 feet of the crest. Grass and low brush were observed between stones in the upper 2 to 4 feet of the riprap right of the spillway. (Photo No. 14). The riprap stone is generally 1 to 3 feet in size with occasional loose stones and voids (Photo No. 5). A 15 foot wide zone of significantly smaller riprap protection consisting of 2 to 5 inch size stones was observed at Station 2+50 and irregular riprap cover was observed on the upstream slope from Station 3+00 to the right abutment (Photo No. 8).

The crest of the dam is grass-covered and in satisfactory condition. However, the crest is depressed approximately 4 inches exposing the top of the concrete core wall right of the spillway at Station 1+90 (Photo No. 6). A depression in the crest five feet long by five feet wide and six inches deep was observed at Station 3 + 25. The horizontal alignment of the crest is irregular, with concave curvature in the downstream direction right of the spillway and concave curvature in the upstream direction left of the spillway (Photo No. 1). No cracks or other indications of movement were visible on the surface of the crest.

The surface of the downstream slope is grass-covered with a slope of approximately 2.2 to 1. Some minor irregularity in the surface of the slope was observed between Station 0+50 and Station 0+80; however, no indications of significant movement were observed. A portion of the downstream slope adjacent to the downstream end of the left training wall of the spillway has been eroded, forming a vertical scarp approximately 9 inches high (Photo No. 15). Several small animal burrows were observed on the downstream slope and toe on the portion of the dam left of the spillway (Photo No. 3) At the time of inspection, the reservoir pool elevation was below the elevation of the downstream toe of the dam, and no seepage was observed.

c. Appurtenant Structures

The spillway consists of a concrete weir and training walls with wooden flashboards, as shown in Photo No. 13. A concrete apron extends about 15 feet downstream from the weir. During the inspection much of this apron was covered with soil and vegetation. Portions of the apron that could be observed appeared to be severely cracked and generally in poor condition. Downstream from the apron the ground surface steps up and is 1 to 2 feet higher than the apron, and there is no observable channel to route water from overflowing the spillway away from the downstream toe of the dam (Photo No. 4). The ground surface is grass-covered with no observable riprap protection. Evidence of erosion at the downstream end of the left training wall was observed (Photo No. 15). A 2 foot diameter stump was observed at the downstream end of the right spillway training wall within the downstream channel near the edge of the apron. (Photo No. 12). There is also a 2 foot diameter stump 3 feet from the upstream edge of the crest at Station 3 + 50. (Photo No. 10).

Cracks, (1/32 inch to 1/8 inch), efflorescences and severe spalling of concrete were observed in the downstream face of the weir and in the training walls (Photo No. 13). The reservoir elevation was below the elevation of the spillway apron at the time of inspection and no seepage was observed.

The gatehouse is a concrete structure with two channels passing through it. It is covered with vines and trees on the outside and has a crack (1/32 of an inch) running along the southerly wall. Effloresing is evident at the top of this crack and seepage from it is found on the inside of the structure. Also, the inside ceiling is flaking.

d. Reservoir Area

There are no indications of instability along the banks of the reservoir in the vicinity of the dam.

e. Downstream Channel

The intake gate at Station 1 + 90 supplies a buried 24 inch diameter concrete conduit leading to gatehouse No. 3 downstream from the dam shown in the right of Photo No. 14. The condition of this conduit could not be inspected.

There is no defined channel downstream from the spillway apron. The natural ground downstream from the spillway apron steps up 1 to 2 feet and is covered with grass.

3.2 Evaluation

On the basis of the visual inspection, Pistapaug Pond Dam is judged to be in fair condition. The following conditions which may affect the long-term performance of the embankment should be studied.

1. Lack of an adequate discharge channel downstream from the spillway and possible erosion of the downstream toe of the dam adjacent to the spillway training wall.

2. Deterioration of the downstream apron of the spillway and concrete on the spillway weir and training walls.

3. Irregular riprap protection on the upstream slope.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedure

a. General

The dam creates an impoundment of the water which is used for water supply purposes. Water is diverted into this Reservoir from Ulbrich Reservoir, leaving southern end of Ulbrich Reservoir through a 16-inch force main. The force main runs to a high point between Ulbrich and Pistapaug and from this point the water flows via an open channel to Pistapaug Pond. Water from Pistapaug Pond enters directly into the Wallingford Water Supply System through a 24-inch cast iron pipe, as discussed in Section 1. The interbasin system of water transfer is shown on Page B-5.

b. Description of any Warning System in Effect

There are no warning systems in effect at this facility.

4.2 Maintenance Procedure

a. General

According to Mr. Bruno of the Wallingford Water and Sewer Department, it is their general policy to keep as much stored water available as possible. The normal operating level is 3-4 feet below the flashboards.

b. Operating Facilities

Maintenance on the operating facilities is not done on a regular basis, but only as necessary for operation.

4.3 Evaluation

The current operating and maintenance procedures for the dam are inadequate. An Operating and Maintenance Manual should be prepared for the dam and operating facilities, and a program of annual technical inspections by qualified registered engineers should be instituted. A formal downstream warning system should be developed and put into effect in case of an emergency at the dam. The 18 inch pipe entering the gatehouse from the reservoir should be gated on the upstream face of the dam to prevent uncontrolled flow through the dam if the pipe were to rupture.

SECTION 5

EVALUATION OF HYDROLOGIC AND HYDRAULIC FEATURES

5.1 General

Pistapaug Pond Dam consists of a 370 foot long earth embankment with a concrete core wall and a 20 foot wide broad crested concrete weir with wooden flashboards. The maximum structural height of the dam is 9 feet. Appurtenant structures other than the spillway include the outlet intake, three gatehouses, and a service building. The spillway weir is at elevation 389.5 and the top of the flashboards is at 391.9 The outlet works consists of a gated intake chamber at invert elevation 383.5 which leads to a 24-inch conduit, a separate ungated 18-inch conduit, one working gatehouse, two 24-inch outlet conduits and two 8-inch drains. The gated pipes enter the gatehouse at elevation 368.6. The outlets are gated and are at elevation 370.0 The drains are gated with inverts elevation 368.5.

Pistapaug Pond Dam is classified as being intermediate in size, having a maximum storage of 4540 acre-feet.

5.2 Design Data

The only design data disclosed for this dam is the information sheet included in Appendix B, showing impounding capacities, drainage area, surface area and spillway elevation.

5.3 Experience Data

The maximum discharge at this dam site is unknown. The maximum observed condition was reported to be to the top of the flashboards. No evidence of damage to any portion of the project from overtopping was visible at the time of inspection.

5.4 Test Flood Analysis

As no detailed design and operation information are available, hydrologic evaluation was performed using dam information gathered by field inspection, watershed size, and an estimated test flood equal to the Probable Maximum Flood (PMF) as determined by guide curves issued by the Corps of Engineers.

Based on a drainage area of 0.50 square miles, and using the curve for rolling terrain (peak inflow = 2250 cfs/square mile), it was estimated that the peak test flood inflow at this dam would be 1125 cfs. Following the guidance for Estimating Effect of Surcharge Storage on Maximum Probable Discharges results in a peak test flood outflow of 0 cfs with flashboards in place, and 120 cfs with flashboards taken out. The maximum spillway capacity with the reservoir at the top of the dam is 325 cfs with the flashboards in and 780 cfs with them out. In either case the spillway can handle 100% of the test flood without overtopping the dam.

5.5 Dam Failure Analysis

The impact of failure of the dam at maximum pool (top of dam) was assessed using the "Rule of Thumb" Guidance for Estimating Downstream Dam Failure Hydrographs issued by the Corps of Engineers.

A breach of the dam would result in a peak discharge of 6005 cfs flowing from a 100 foot wide opening which would include the spillway. The pre-failure flow would be 325 cfs.

A major breach of the dam would result in discharge into an unnamed tributary to Mill River which flows 6250 feet downstream to Route 17. Route 17, which is a heavily travelled state road, would be washed out by this flow and four low lying houses would be subject to the floodwaters, with the possible loss of more than a few lives. This would justify a HIGH hazard rating.

Downstream flood stages for various distances that probably would result from a major breach are as follows:

Downstream Reach (in feet downstream of dam)	Pre-Failure Flood Elev.	Post-Failure Flood Elev.	Houses/Elev.
900	370.1	372.5	
2300	341.2	345.3	
3700	311.5	316.8	
6250	271.0	274.5	4/270.0

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observation

The visual observations did not disclose any immediate instability problems. However, during periods of heavy overflow of the spillway, flooding and possible erosion of the downstream toe and slope of the dam could affect the stability of the downstream slope. Continued deterioration of the downstream apron could permit erosion downstream from the spillway weir during periods of overflow. Soil and vegetation overlying the the apron should be removed so that the condition of the apron can be carefully inspected and the need for repair can be assessed.

Irregular riprap protection on the upstream slope could result in erosion during higher reservoir levels, and this condition should be repaired.

6.2 Design and Construction Data

Design plans of the original dam and two subsequent raisings of the dam prepared by W. A. MacKenzie and dated October 14, 1941 have been included in Appendix B of this report.

The design drawings indicate the dam is an embankment section with a central concrete core wall extending into the dam foundation to an indeterminate elevation.

No operating records pertinent to the analysis of the structural stability of the dam were available.

6.3 Post-Construction Changes

In 1911. the elevation of the crest of the dam and the top of the core wall was raised 2 feet. In 1941, the crest of the dam and the top of the core wall were raised an additional 3 feet. A row of steel sheeting approximately 8 to 10 feet in length was installed along the edge of the spillway apron. These design plans indicate that irregularity in the horizontal alignment of the crest observed on the visual inspection resulted from original construction and subsequent raising of the dam.

6.4 Seismic Stability

The dam is located in Seismic Zone 1, and in accordance with Corps of Engineers' guidelines, does not warrant further seismic analysis at this time.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection Pistapaug Pond Dam is judged to be in fair condition.

b. Adequacy of Information

The information obtained from the design drawings and the results of the visual inspection are adequate for this Phase I study, with the exception that potential seepage problems could not be evaluated on the basis of the visual inspection because of the low level of water in the reservoir on the date of inspection.

c. Urgency

The recommendations and remedial measures presented in Sections 7.2 and 7.3 should be implemented by the Owner within one year after receipt of the Phase I report.

7.2 Recommendations

The Owner should retain the services of a registered professional engineer qualified in the design and inspection of dams to accomplish the following:

1. Design and oversee construction of a discharge channel for the spillway.

2. Remove soil and vegetation covering the downstream apron of the spillway, inspect its condition and design repairs and observe their implementation, if required.

3. Design and oversee repairs to riprap protection on the upstream slope.

4. Design repairs to concrete spalling and efflorescence of spillway weir and training walls including erosion of the left training wall.

5. Remove stumps and roots from discharge channel of spillway adjacent to downstream end of right training wall and backfill voids with appropriate compacted soil.

6. Fill animal burrows at downstream toe, Station 1 + 35 with selected compacted soil.

7. Inspect the dam for evidence of seepage problems when there is additional water in the reservoir.

8. Fill in crest depressions with proper compacted soil.

7.3 Remedial Measures

a. Operation and Maintenance Procedures. The Owner should:

1. Clear brush growing through riprap on the upstream slope and cut grass on crest, upstream and downstream slopes, as part of a routine maintenance program.

2. Institute a program of annual technical inspection by a registered professional engineer.

3. Establish a surveillance program for use during and immediately after heavy rainfall and also a downstream warning program to follow in case of emergency.

4. Fill in all animal burrows.

5. Establish a protective cover over all bare areas.

6. An Operations and Maintenance Manual should be prepared for the dam and operating facilities.

7.4 Alternatives

There are no practical alternatives to the recommendations of Sections 7.2 and 7.3.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT PISTAPAUG POND DAM

DATE November 24, 1980

TIME 11:15 a.m.

WEATHER Light rain, 45°F.

W.S. ELEV. 386.7 U.S. ____ DN.S.

PARTY:

1. P. Patel - Genovese
2. W. Gancarz - Genovese
3. R. Murdock - GEI
4. R. Stetkar - GEI
5. ____
6. ____
7. ____
8. ____
9. ____
10. ____

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Geotechnical	R. Murdock, R. Stetkar	
2.	Structural	P. Patel	
3.	Hydraulics	W. Gancarz	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT PISTAPAUG POND DAM — DATE November 24, 1980

PROJECT FEATURE Dam Embankment — NAME

DISCIPLINE Geotechnical/Hydraulics — NAME Murdock/Stetkar/Gancarz

DAM EMBANKMENT	
Crest Elevation	394.5
Current Pool Elevation	386.7
Maximum Impoundment to Date	393.9
EI Surface Cracks	None observed
Pavement Condition	N/A
EI Movement or Settlement of Crest	Local settlement 4 inches deep on crest at Sta 1+90 has exposed 9 inch wide concrete
EI Lateral Movement	core wall. 6 inch deep and 5 foot diameter depression in crest at Sta 3+25
Vertical Alignment	None observed
Horizontal Alignment	Good
EI Condition at Abutment and at Concrete Structures	Crest bends in downstream direction right of spillway and bends in upstream direction left of spillway
EI Indications of Movement of Structural Items on Slopes	Good
EI Trespassing on Slopes	N/A
EI Sloughing or Erosion of Slopes or Abutments	Free access to crest and slopes. Maintenance building on downstream slope, Sta 3+00. Excavation on upstream side of building cuts 5 feet into downstream side of crest. Small animal burrows on downstream slope and toe of left of spillway. Minor undulation on surface of downstream slope at Sta 0+50 and Sta 0+80. Erosion of downstream slope of embankment downstream from left training wall of spillway.

PERIODIC INSPECTION CHECKLIST

PROJECT PISTAPAUG POND DAM DATE November 24, 1980

PROJECT FEATURE Dam Embankment NAME

DISCIPLINE Geotechnical/Hydraulics NAME Murdock/Stetkar/Gancarz

	AREA EVALUATED	CONDITION
RL	Rock Slope Protection - Riprap Failures	Riprap generally 1 to 3 foot size. Occasional loose stones and voids in riprap protection. 15 foot long zone of small riprap (2 to 5 inches) at Sta 2+50. Inadequate riprap protection from Sta 3+00 to right abutment on upstream slope.
EI	Unusual Movement or Cracking at or Near Toe	None observed
FI	Unusual Embankment or Downstream Seepage	None observed
EI	Piping or Boils	None observed
I	Foundation Drainage Features	None observed
FI	Toe Drains	None observed
EI	Instrumentation System	None observed
	Vegetation	Crest and downstream slope is grass covered. Grass growing between riprap on upper 4 feet of upstream slope. 2 foot diameter stump on crest at Sta 3+50. 2 foot diameter stump downstream from right training wall of spillway at downstream toe.

PERIODIC INSPECTION CHECK LIST

PROJECT PISTAPAUG POND DAM DATE November 24, 1980

PROJECT FEATURE Dike Embankment NAME

DISCIPLINE Geotechnical NAME Murdock/Stetkar

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	No dike embankment
Crest Elevation	
Current Pool Elevation	
Maximum Impoundment to Date	
Surface Cracks	
Pavement Condition	
Movement or Settlement of Crest	
Lateral Movement	
Vertical Alignment	
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	
Indications of Movement of Structural Items on Slopes	
Trespassing on Slopes	
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection - Riprap Failures	
Unusual Movement or Cracking at or near Toes	
Unusual Embankment or Downstream Seepage	
Piping or Boils	
Foundation Drainage Features	
Toe Drains	
Instrumentation System	
Vegetation	

PERIODIC INSPECTION CHECK LIST

PROJECT PISTAPAUG POND DAM DATE November 24, 1980

PROJECT FEATURE Intake Channel NAME

DISCIPLINE Geotechnical/Structural/Hydraulics NAME Murdock/Stetkar/Patel/Gancarz

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	Approach channel under water and not observable
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	None
Log Boom	N/A
Debris	Some brush and small tree limbs
Condition of Concrete Lining	
Drains or Weep Holes	None observed
b. Intake Structure	
Condition of Concrete	Good
Stop Logs and Slots	Screen needs repair or replacement

PERIODIC INSPECTION CHECK LIST

PROJECT PISTAPAUG POND DAM — DATE November 24, 1980 January 20, 1981

PROJECT FEATURE Control Tower — NAME

DISCIPLINE Structural — NAME Patel/Gancarz

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	Fair - Extensive vine/tree growth on outside of building
Condition of Joints	Good
Spalling	Entire ceiling is flaking
Visible Reinforcing	None
Rusting or Staining of Concrete	None
Any Seepage or Efflorescence	Yes- South Wall has efflorescing
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	Yes - leak from crack in south wall
Cracks	Yes - south wall
Rusting or Corrosion of Steel	None
b. Mechanical and Electrical	
Air Vents	None
Float Wells	Good
Crane Hoist	None
Elevator	None
Hydraulic System	None
Service Gates	Good
Emergency Gates	None
Lightning Protection System	None
Emergency Power System	None
Wiring and Lighting System	Good

PERIODIC INSPECTION CHECK LIST

PROJECT PISTAPAUG POND DAM DATE November 24, 1980

PROJECT FEATURE Transition & Conduit NAME

DISCIPLINE Structural NAME Patel

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	Not visible
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECK LIST

PROJECT PISTAPAUG POND DAM DATE November 24, 1980

PROJECT FEATURE Outlet Channel NAME

DISCIPLINE Geotechnical/Structural/Hydraulics NAME Murdock/Stetkar/Patel/Gancarz

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Outlet channel consists of buried 24 inch diameter pipeline to pump station, not observable
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	N/A
Channel	
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

PERIODIC INSPECTION CHECK LIST

PROJECT PISTAPAUG POND DAM — DATE November 24, 1980

PROJECT FEATURE Spillway weir and channel — NAME

DISCIPLINE Geotechnical/Structural/Hydraulics — NAME Murdock/Stetkar/Patel/Gancarz

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Satisfactory
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Under water and not observable
b. Weir and Training Walls	
General Condition of Concrete	Fair
Rust or Staining	None
Spalling	Spalling along construction joint at downstream face of weir. Spalling at training walls. Erosion under left training wall.
Any Visible Reinforcing	None
Any Seepage or Efflorescence	Efflorescence on right training wall.
Drain Holes	None observed
c. Discharge Channel	
General Condition	Poor. Concrete apron downstream from weir badly cracked and deteriorated. Soil and vegetation covering apron prevented observation of entire apron. No downstream channel to route spillway overflow away from toe of embankment.
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	
Floor of Channel	Concrete apron extending about 15 feet downstream from weir, covered with soil. Broad, flat grass-covered area downstream from apron with no observable channel or riprap protection.
Other Obstructions	

PERIODIC INSPECTION CHECKLIST

PROJECT PISTAPAUG POND DAM DATE November 24, 1980

PROJECT FEATURE Spillway weir and channel NAME

DISCIPLINE Geotechnical/Structural/Hydraulics NAME Murdock/Stetkar/Patel/Gancarz

AREA EVALUATED	CONDITION
DISCHARGE CHANNEL	
c. Other Comments	Water overflowing spillway may flood downstream toe of dam next to spillway.

PERIODIC INSPECTION CHECK LIST

PROJECT PISTAPAUG POND DAM DATE November 24, 1980

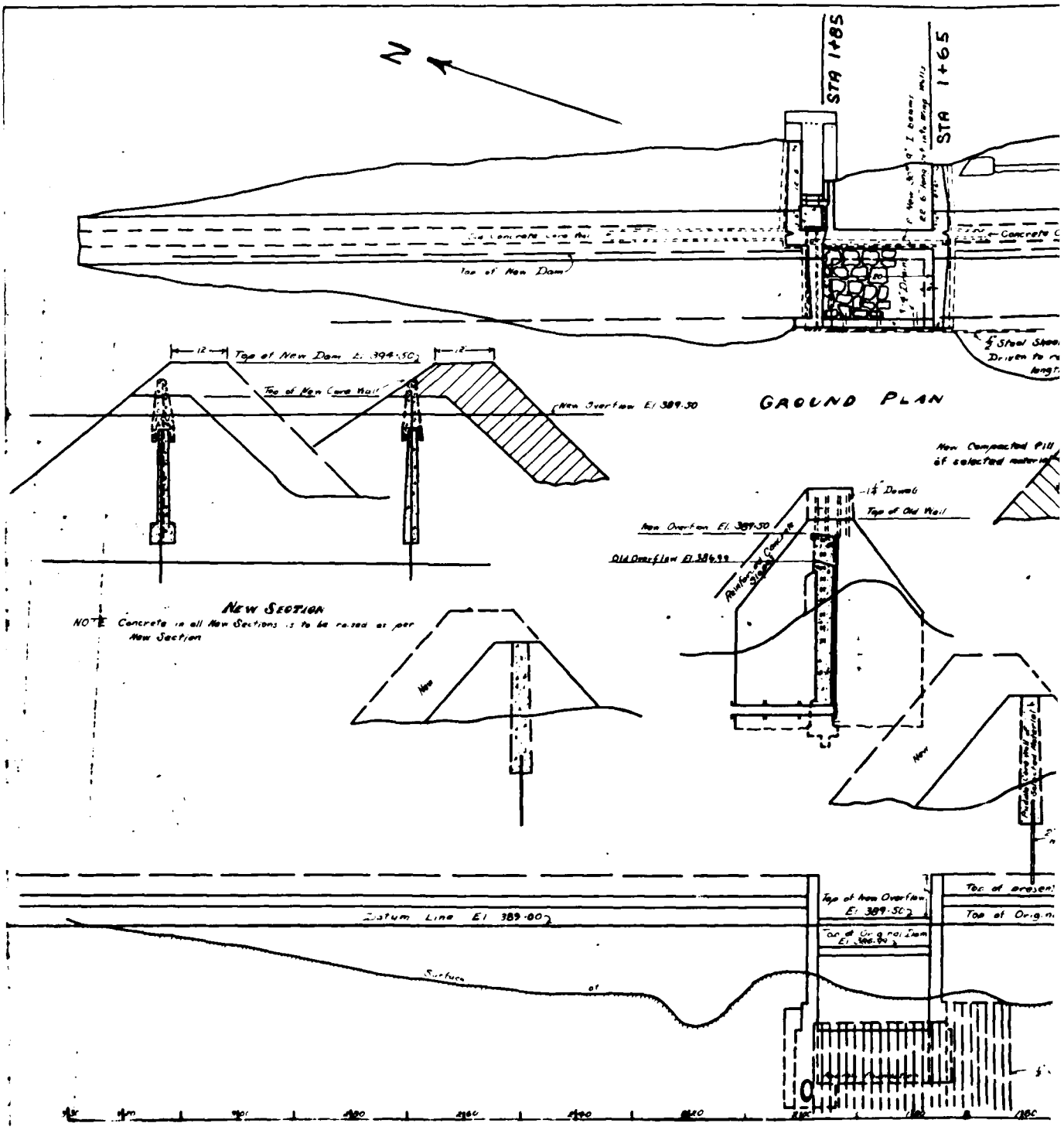
PROJECT FEATURE _____ NAME _____

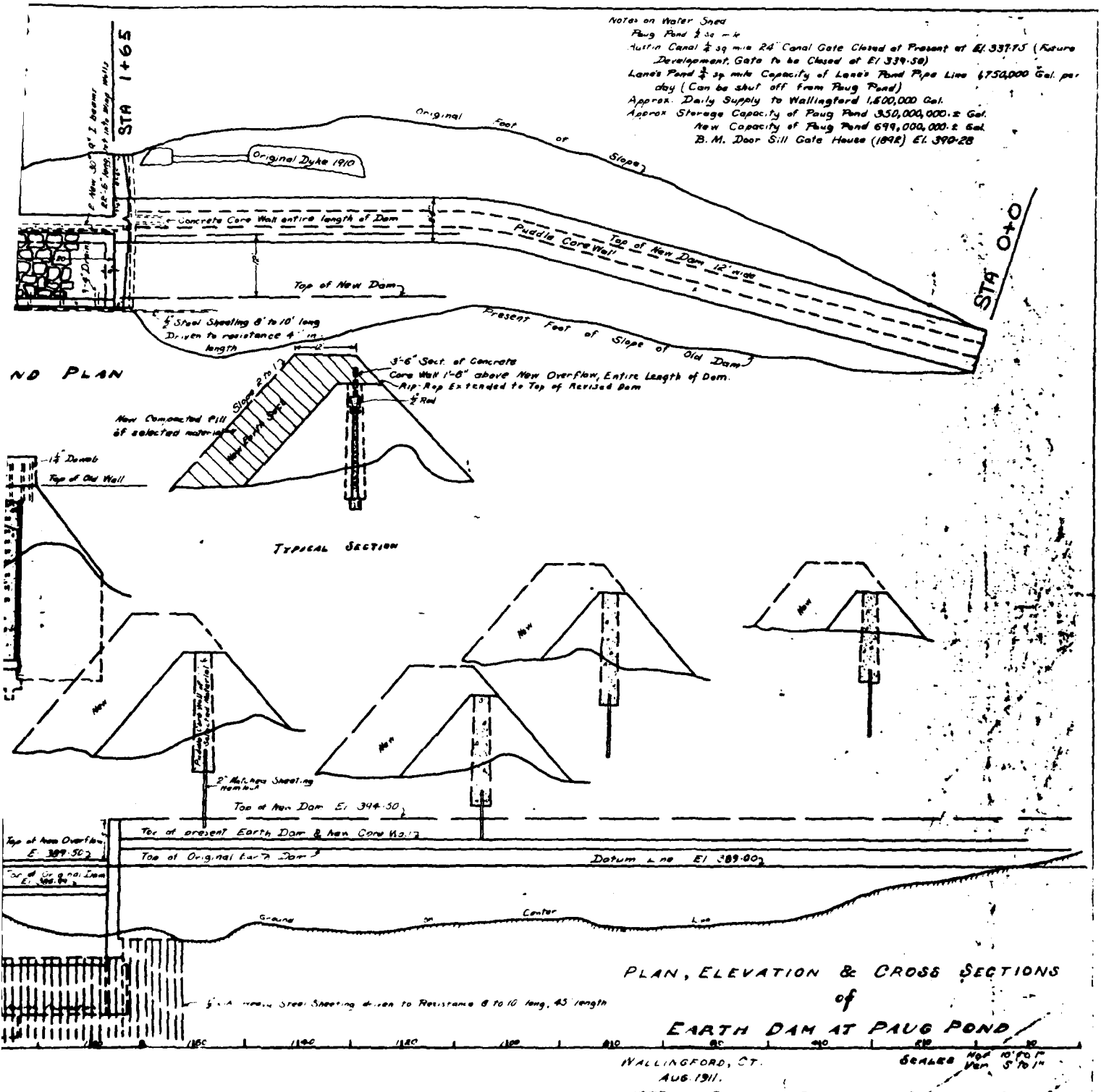
DISCIPLINE Geotechnical/Structural/Hydraulics NAME Murdock/Stetkar/Patel/Gancarz

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	None observed
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
l. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

ENGINEERING DATA


N
STA 1+85
STA 1+65
Top of New Dam
GROUND PLAN
Top of New Dam El. 394.50
Top of New Core Wall
New Overflow El 389.50
NEW SECTION
NOTE Concrete in all New Sections is to be raised as per New Section
New Compacted Fill of selected material
Top of Old Wall
New Overflow El. 389.50
Old Overflow El. 384.99
New
Datum Line El 389.00
Top of New Overflow El. 389.50
Surface of



PLAN, ELEVATION & CROSS SECTIONS
of
EARTH DAM AT PAUG POND

WALLINGFORD, CT.
AUG. 1911.

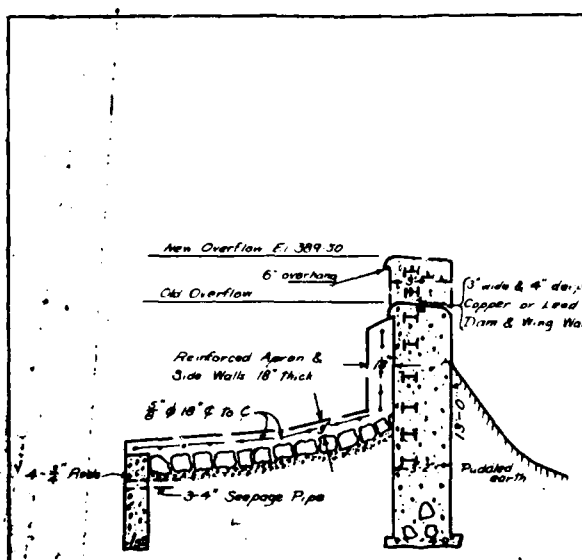
SCALES Hor. 10 Feet to 1 in.
Ver. 5 to 1 in.

NOTE Use Elevations & Distances in preference to scale

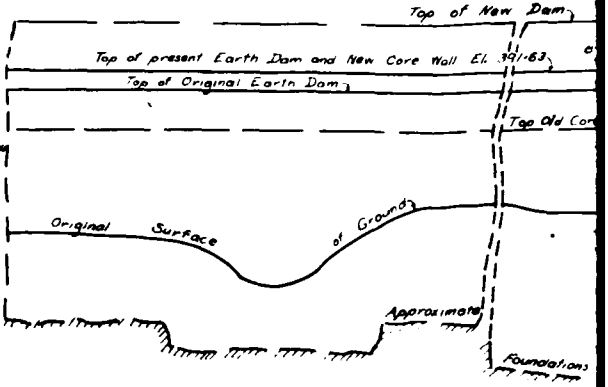
NOTE PLAN REVISED FOR RAISE OF DAM OCT 14 1941

Wm. A. MacKenzie, C.E.

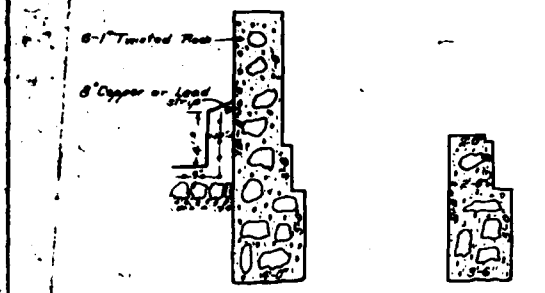
B-1



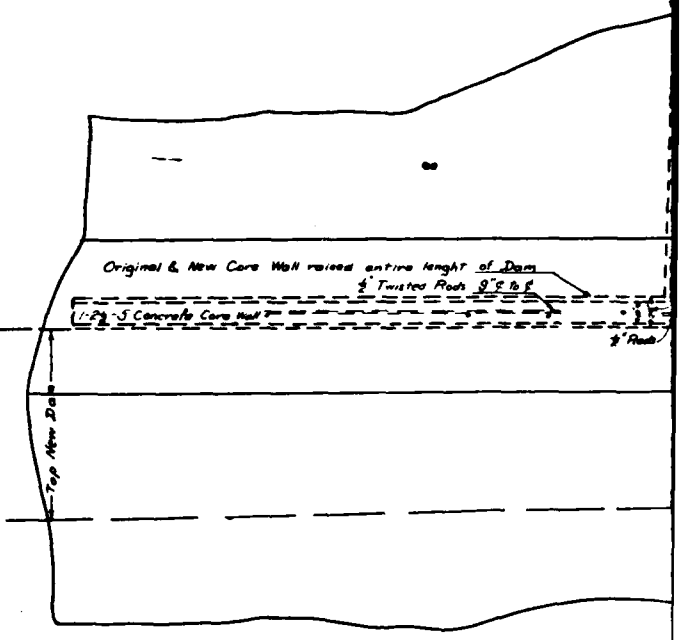
SECTION OF OVERFLOW
LINE A-B



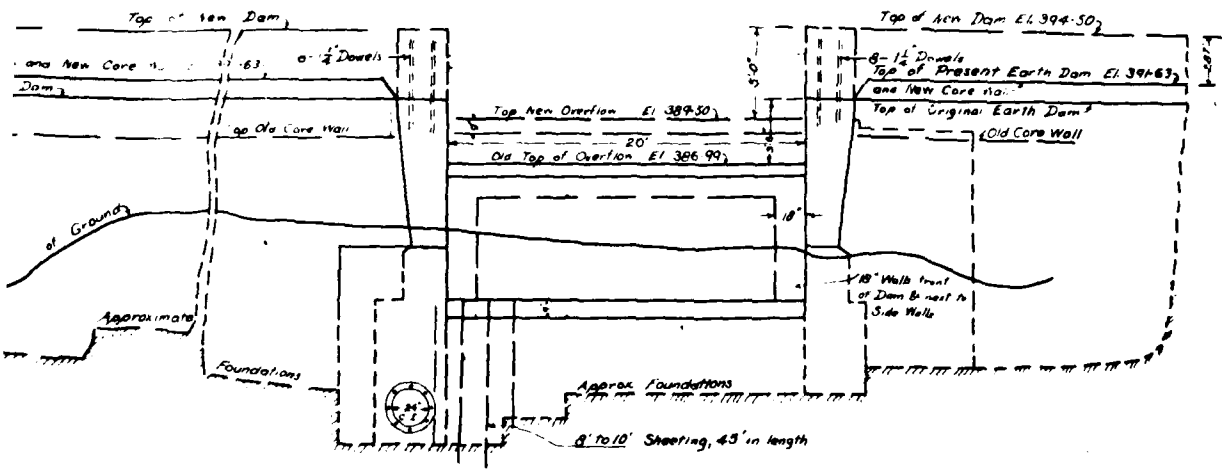
SECTION



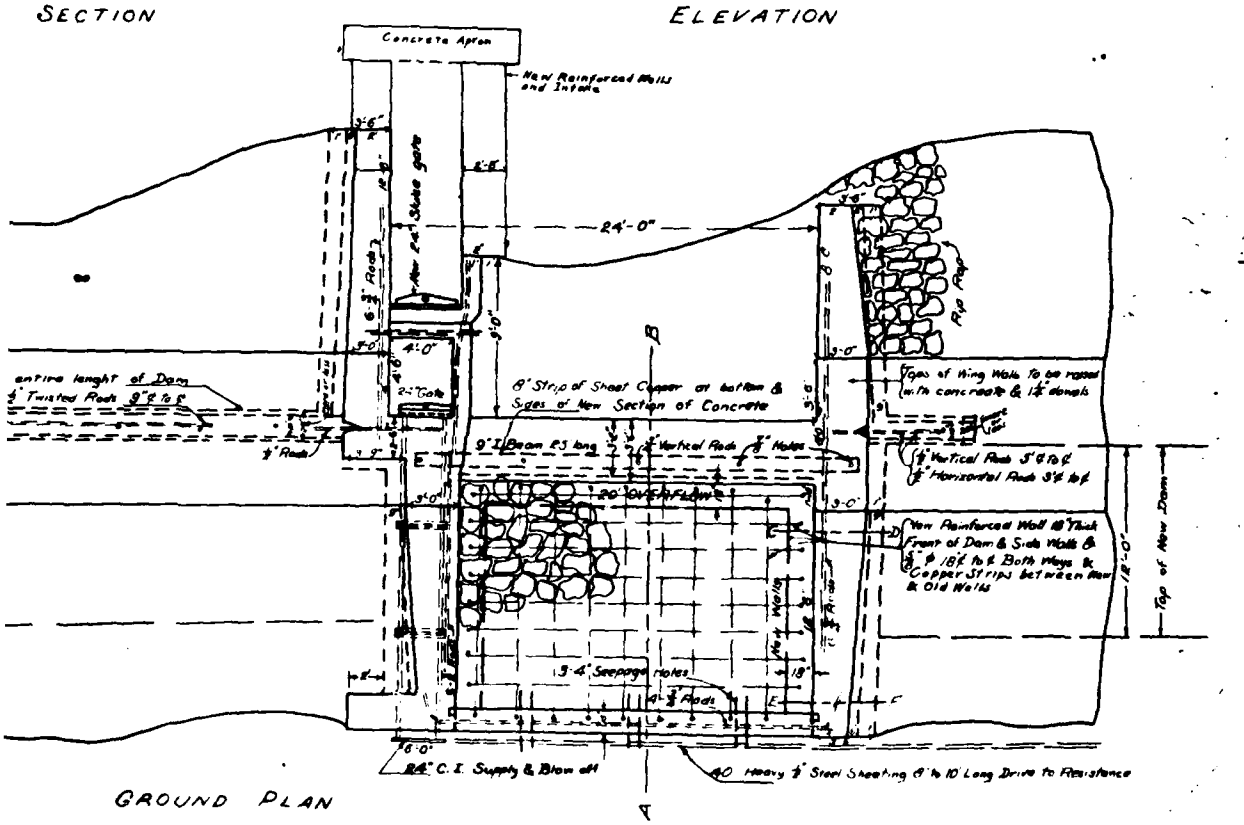
LINE C-D LINE E-F
SECTIONS OF WING WALL



GROUND PLA



SECTION ELEVATION



GROUND PLAN

DETAIL PLAN
of
CONCRETE OVERFLOW

SCALE ½" to 1'

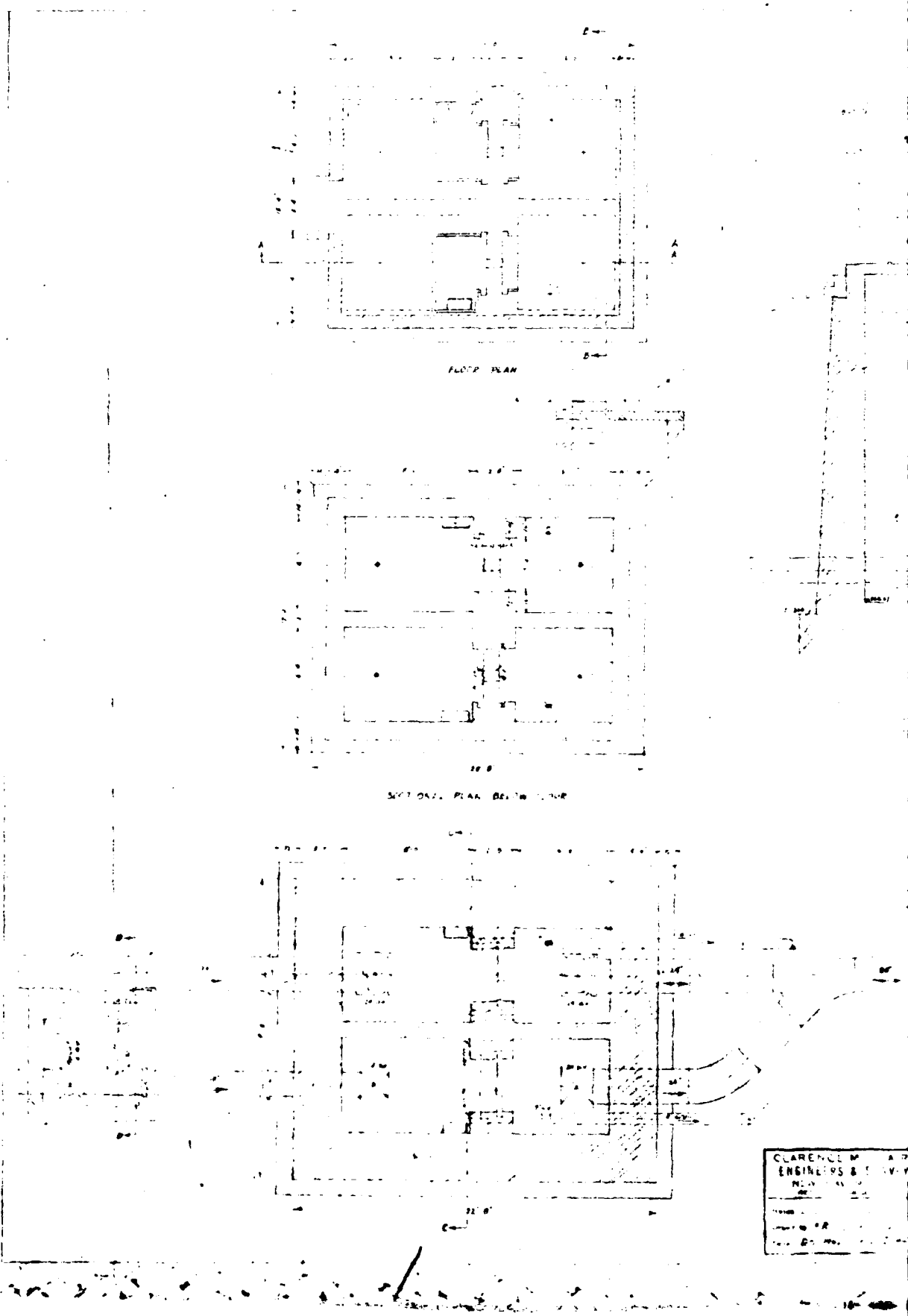
NOTE PLAN REVISED FOR RAISE OF DAM, OCT 14 1941

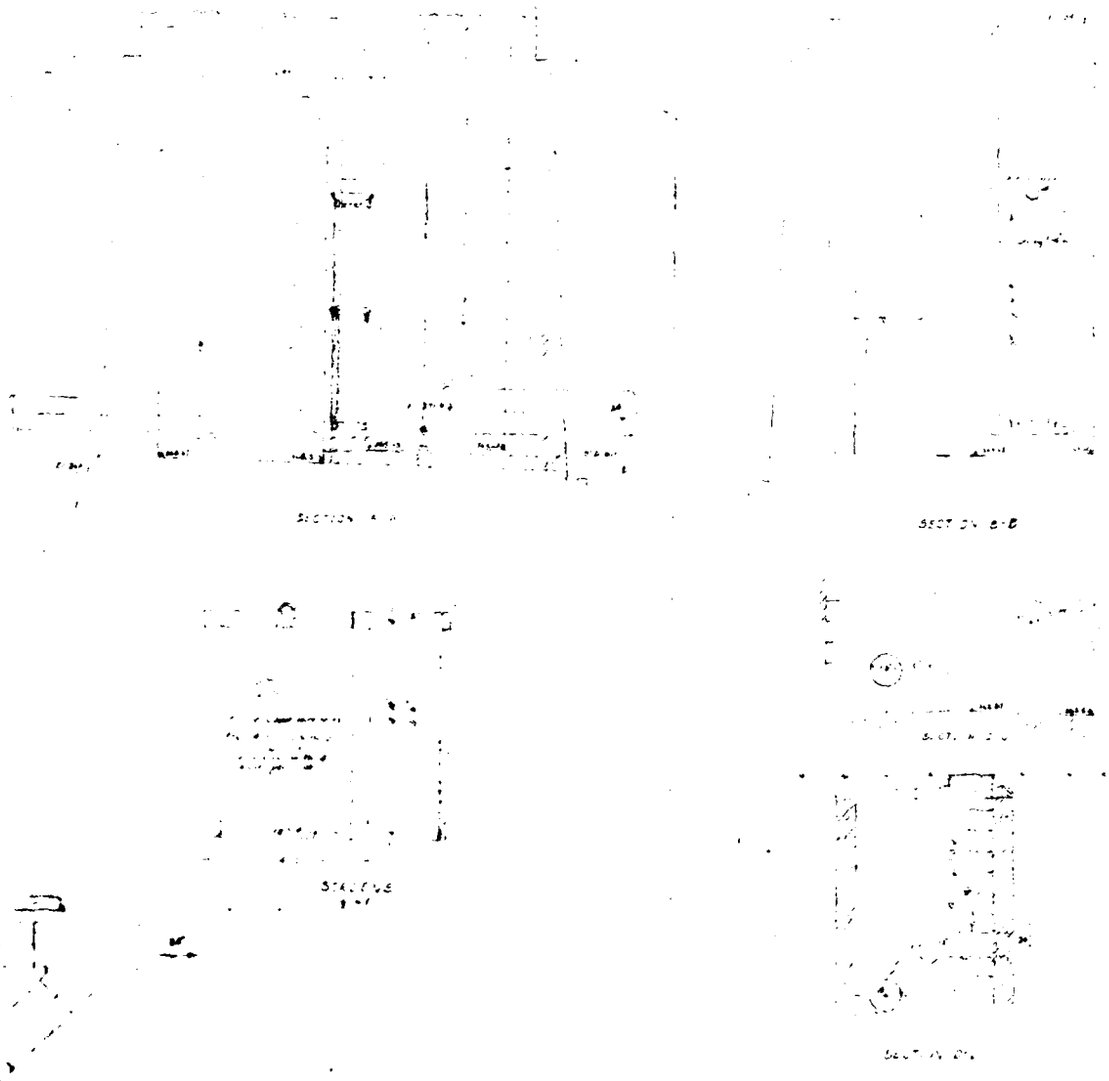
Wm A MacKenzie C.E. No 254

PAUO POND D-

2.

B-2





WATER EQUIVALENT - BOROUGH OF WALLINGFORD
PLAN OF GATE HOUSE

2

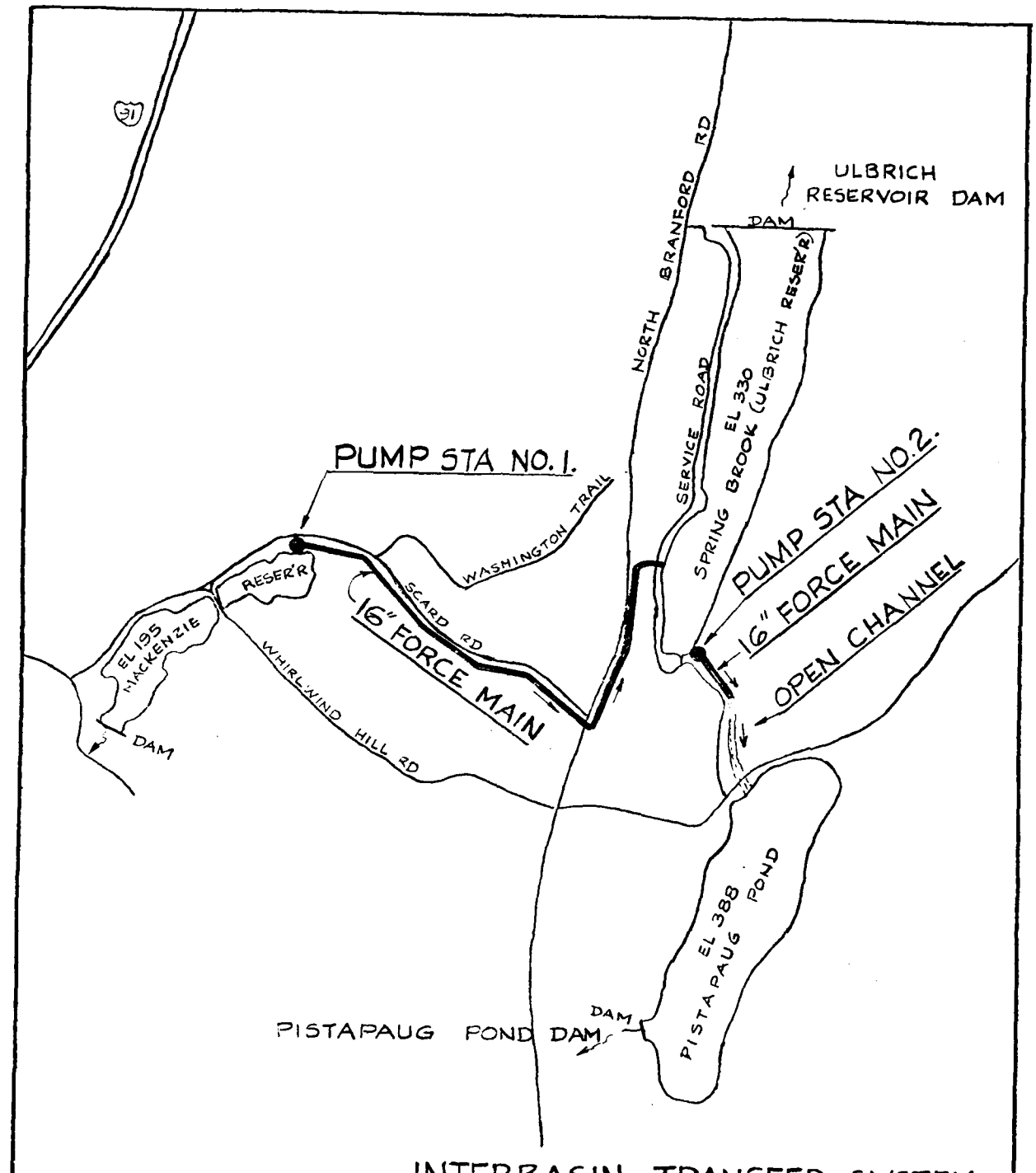
B-3

BC 11/19/80

PAUG POND — Pistapaug Pond Dam -- CT00034

Spillway Elevation - 391.5 Ft. above Sea Level
Capacity - 1,338,071,250 U.S. Gallons
Watershed Area - 320.29 Acres = 0.50 sq. miles
Surface Area (Full) - 194.86 Acres = 0.23 sq. miles

ELEVATION T. ABOVE SEA LEVEL)	TOTAL IMPOUNDED (GALS.)	STORAGE AVAILABLE (GALS.)
391.5	1,338,071,250	0
390.5	1,290,746,250	47,325,000
389.5	1,243,571,250	94,500,000
388.5	1,196,546,250	141,525,000
387.5	1,149,671,250	188,400,000
387	1,126,290,000	211,781,250
386	1,079,562,480	258,508,770
385	1,033,114,500	304,956,750
384	988,480,070	349,591,180
383	944,013,250	394,058,000
382	900,183,400	437,887,850
381	856,615,750	481,455,500
380	813,897,350	524,173,900
379	771,434,500	566,636,750
378	731,202,290	606,868,960
377	691,210,750	646,860,500
376	653,560,640	684,510,610
375	616,135,750	721,935,500
374	581,769,210	756,302,040
373	547,608,250	790,463,000
372	514,980,750	823,090,500
Bottom	0	1,338,071,250



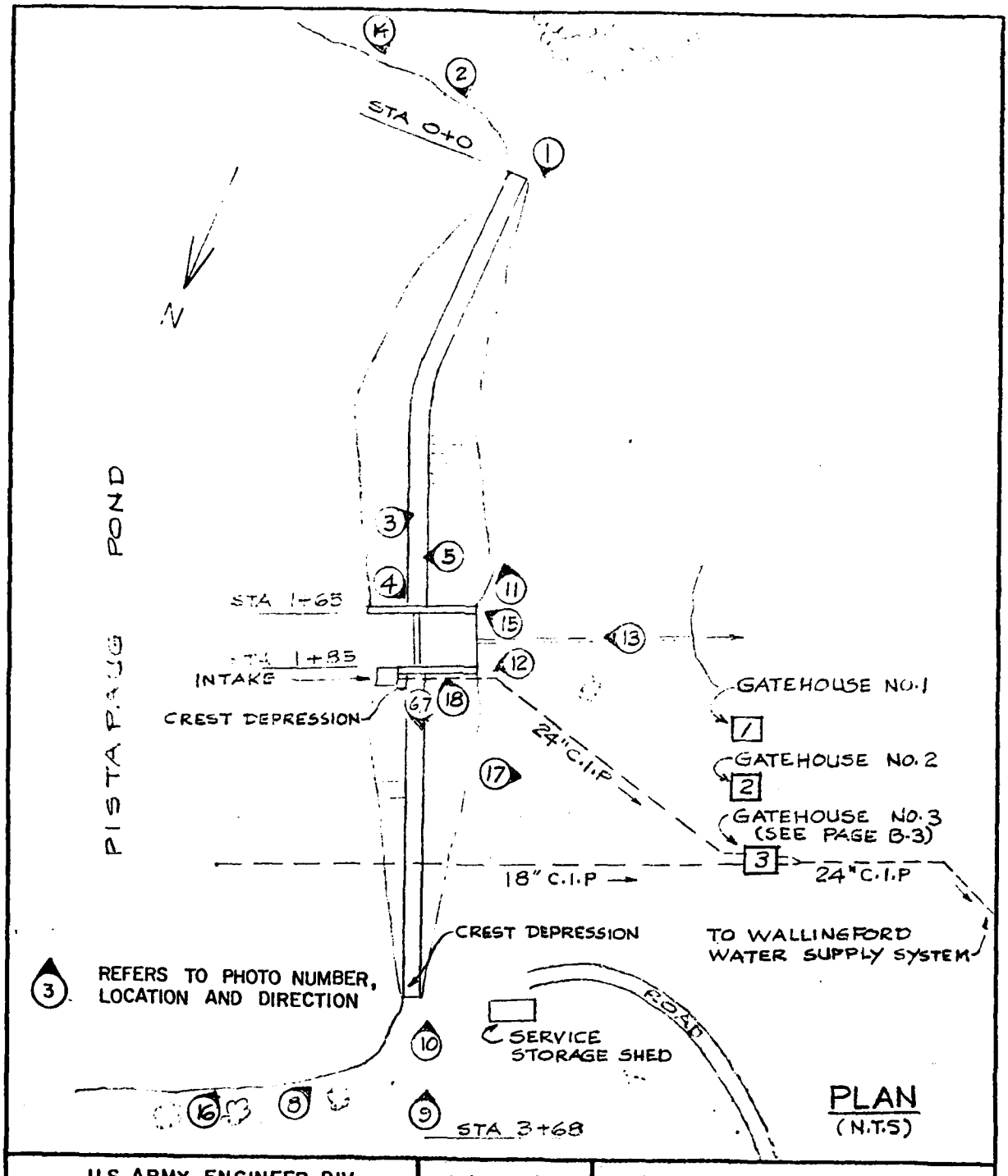
INTERBASIN TRANSFER SYSTEM

WALLINGFORD WATER CO.

PHILIP W. GENOVESE & ASSOCIATES, INC. ENGINEERS HAMDEN, CONNECTICUT	PISTAPAUG POND DAM (CT00034)

APPENDIX C

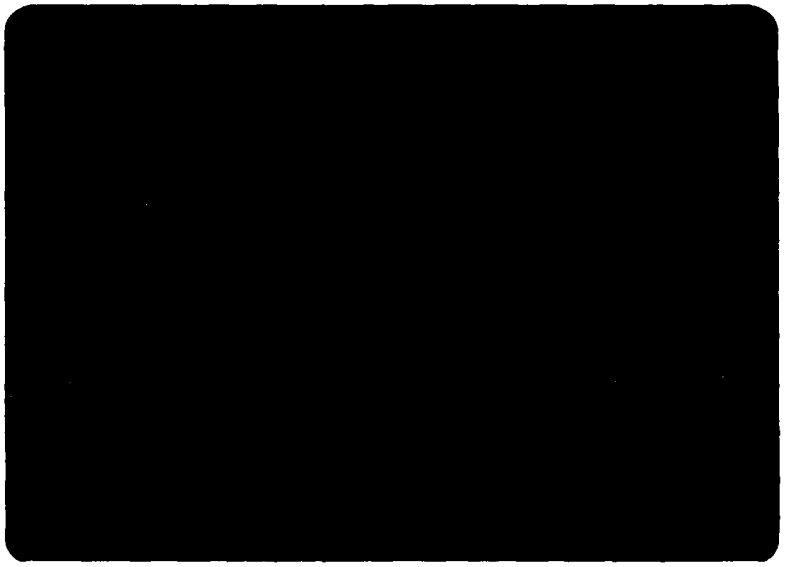
PHOTOGRAPHS



U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	PHOTO LOCATION PLAN
PHILIP W. GENOVESE AND ASSOCIATES, INC. ENGINEERS-HAMDEN, CT.		PISTAPAUG POND DAM FARM RIVER WALLINGFORD, CONNECTICUT

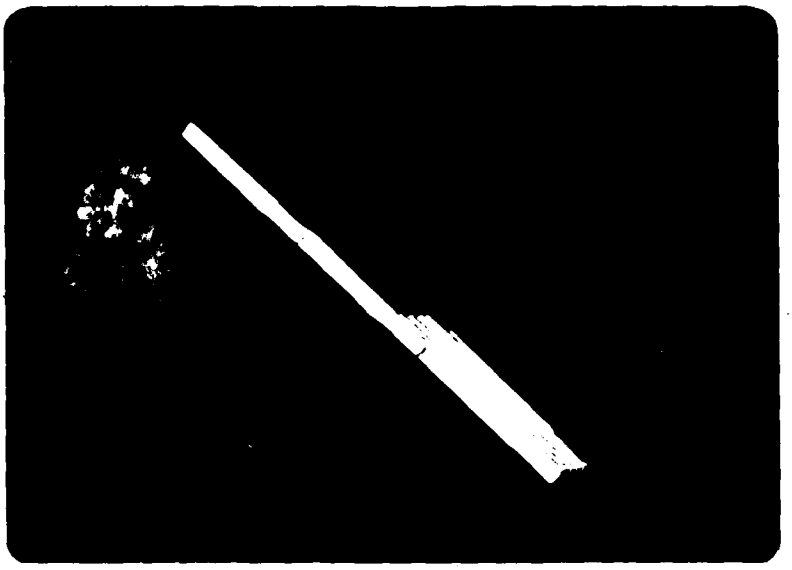
1. Crest of dam looking toward right abutment. Note undulation in horizontal alignment of crest.

2. Upstream slope of dam viewed from left abutment.

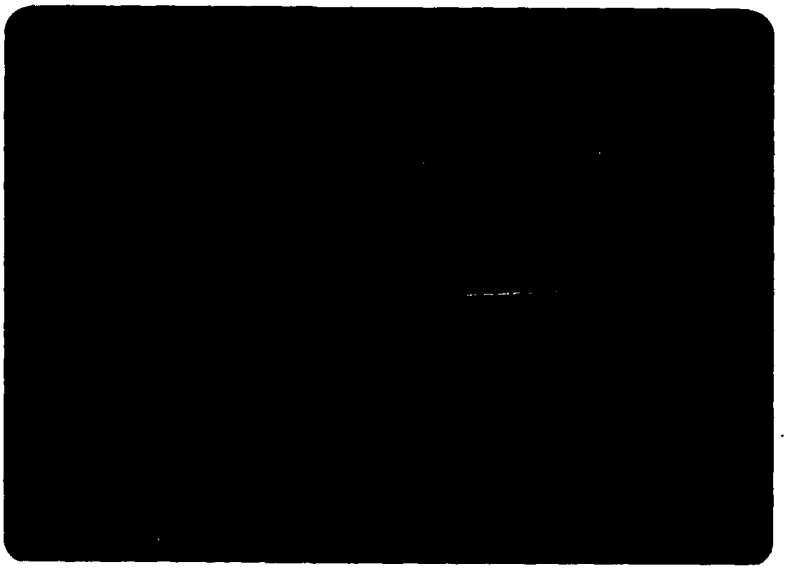


3. View of small animal burrows at downstream toe, Sta 1+35.

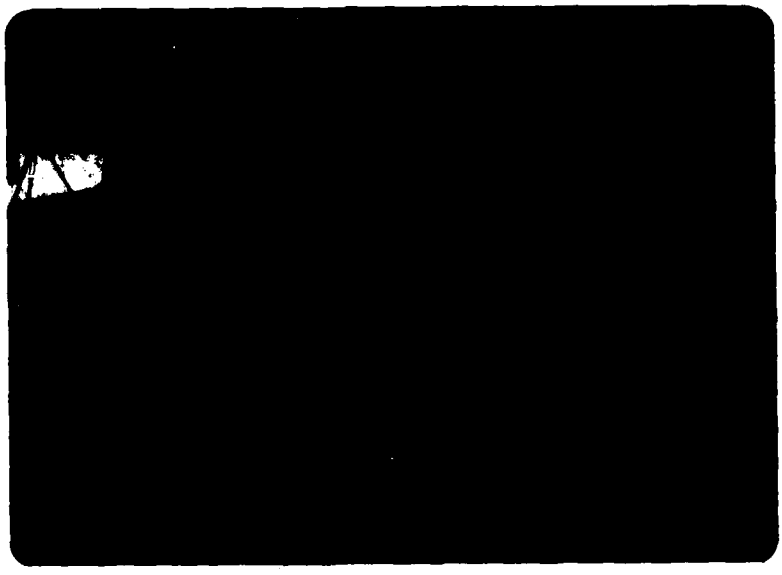
4. View of area downstream from spillway from the left spillway abutment, Sta 1+62. Note lack of downstream channel. 4-inch-diameter pipe in center of photo drains apron downstream of spillway.



5. Close-up view of void in riprap on upstream slope at Sta 1+45. Void is 9 inches long, 8 inches wide, and 12 inches deep.



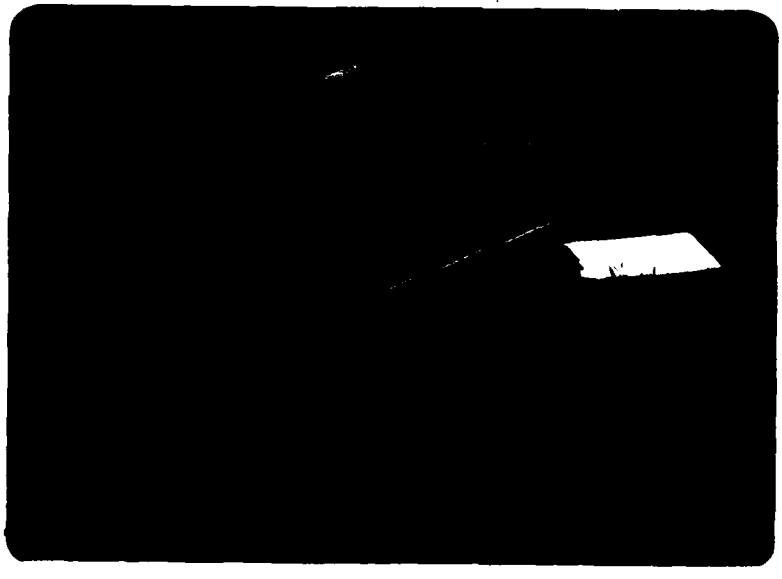
6. View of local settlement at crest at Sta 1+90 exposing 9-inch-wide concrete core wall.



7. Upstream slope of dam looking toward right abutment from Sta 1+90.

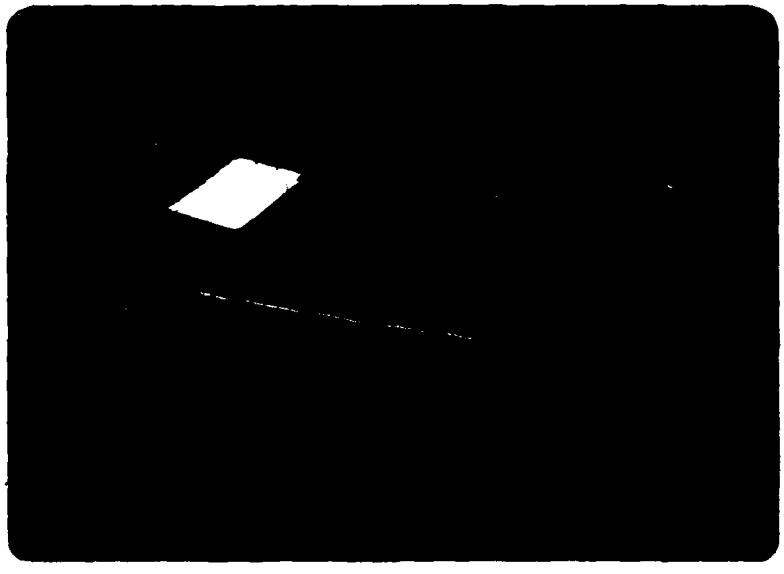
8. View of irregular riprap protection on upstream slope near right abutment at Sta 3+68.

9. Crest of dam looking toward right abutment at Sta 3+68.



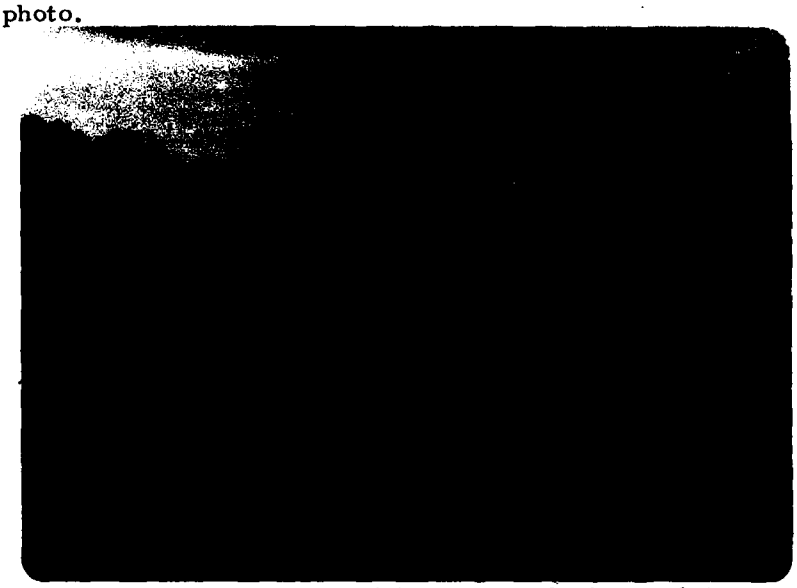
10. Close-up view of 2 foot diameter stump 3 feet from upstream edge of crest at Sta 3+50.

11. Downstream slope and toe of dam looking toward left abutment from left spillway training wall at Sta 1+62.



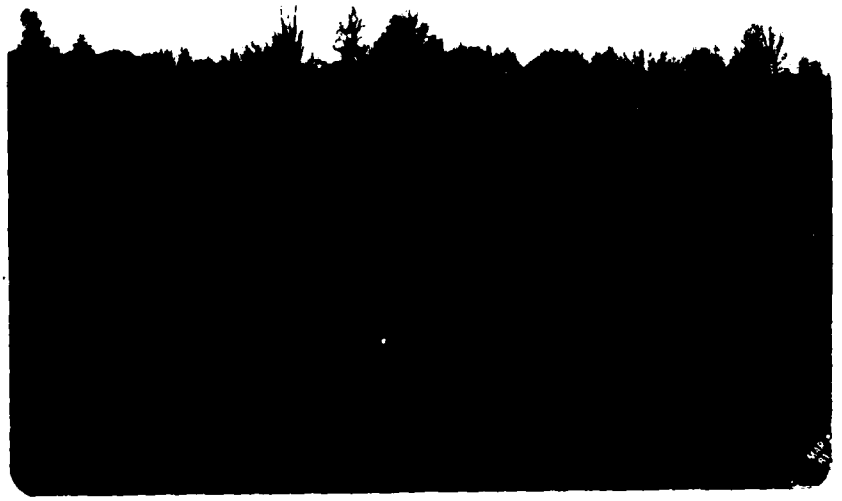
12. Close-up view of 2 foot diameter stump at downstream end of right spillway training wall.

13. Downstream face of spillway with flashboard at crest. Note spalling of concrete and efforescence on downstream face. Downstream concrete apron of spillway is covered with soil and vegetation and not observable in photo.



14. Upstream slope of dam viewed from the left shore of the reservoir opposite Sta 0+00. Note intake structure right of spillway for buried conduit leading to gatehouses on left side of photo.

15. Close-up view of erosion of downstream slope of dam at downstream end of spillway training wall. Erosion feature is 9 inches deep.



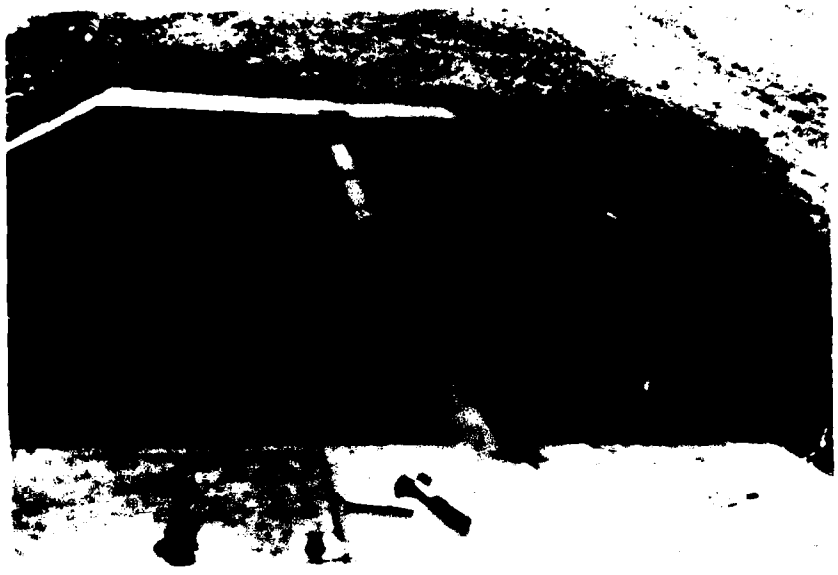
16. Upstream face of dam. Note the spillway and intake structure near the center of the photo.

17. View of the three gatehouses taken from the dam looking downstream. The only working gatehouse is located at the right of the picture.

PHILIP W. GENOVESE & ASSOCIATES, INC.
ENGINEERS HAMDEN, CONNECTICUT

PISTAPAUG POND DAM (CT00034)

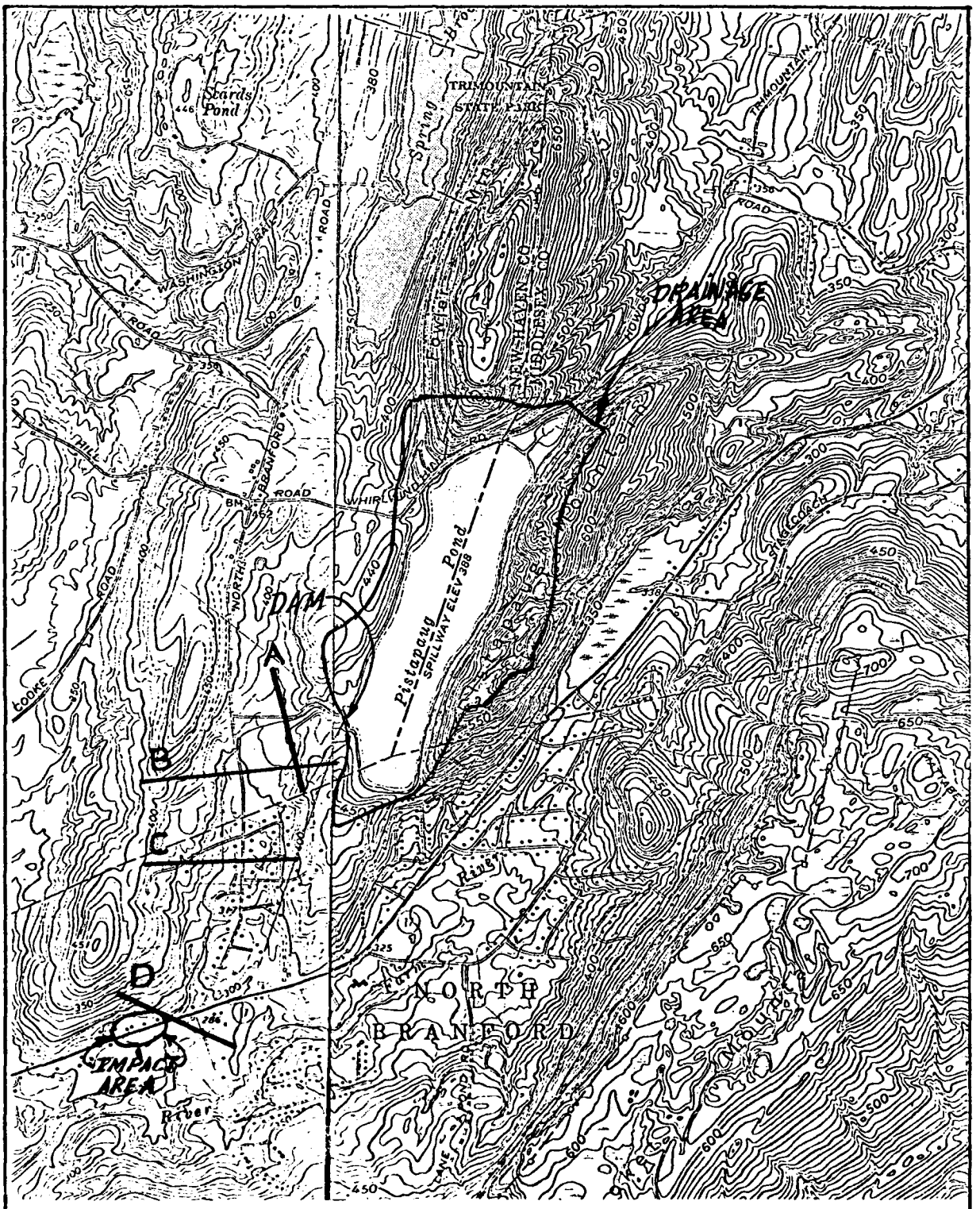
C-10



18. Spillway with flashboards in place, taken from right spillway abutment. Note outlet control stem valve located in forefront of picture.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



DRAINAGE & IMPACT AREA

WALLINGFORD, DURHAM QUAD

DRAINAGE AREA 0.5 SQ.M

PHILIP W. GENOVESE & ASSOCIATES, INC.

ENGINEERS HAMDEN, CONNECTICUT

PISTAPAUG POND DAM (CT00034)

D-A

PROJ. NO. [illegible] GENOVESE AND ASSOCIATES SHEET NO. D1 OF 18
DESCRIPTION [illegible] POND DAM CONSULTING ENGINEERS BY TKC DATE 12/?/[illegible]
[illegible], CT. HAMDEN, CONN. CHKD. BY WJG DATE 2/9/81

Hydrologic/Hydraulic Computations
[illegible] Pond Dam

Size Classification:

Surface Area = 144.9 ac. ; Drainage Area = 0.50 mi²

Top of Dam = elev 394.5
Downstream L.P. = elev. 385.3
Height of Dam = 9.2 feet

Storage (S) = 4165 ac-ft to top of flashboard

S = 4165 + 2.6(144.9) = 4542 ac-ft

∴ The size of the dam is INTERMEDIATE. The hazard potential classification chosen is HIGH since there are a [illegible] of homes [illegible] to the [illegible] of a [illegible] less than [illegible] feet [illegible] the dam. A Spillway [illegible] Flood [illegible] of [illegible] the Probable Maximum Flood (PMF) [illegible] chosen [illegible] [illegible] lives [illegible] property.

In rolling terrain, the PMF in cfs/mi² will take as 2250 (the [illegible] a [illegible] drainage area size of 2 mi²). Therefore, the test flood will be:

SDF = PMF = (2250) cfs/mi² (0.50 mi²)

SDF = 1125 cfs

∴ Volume of test flood = (53.3) $\frac{ac\text{-}ft}{in \cdot mi^2}$ (0.50) mi² (19")

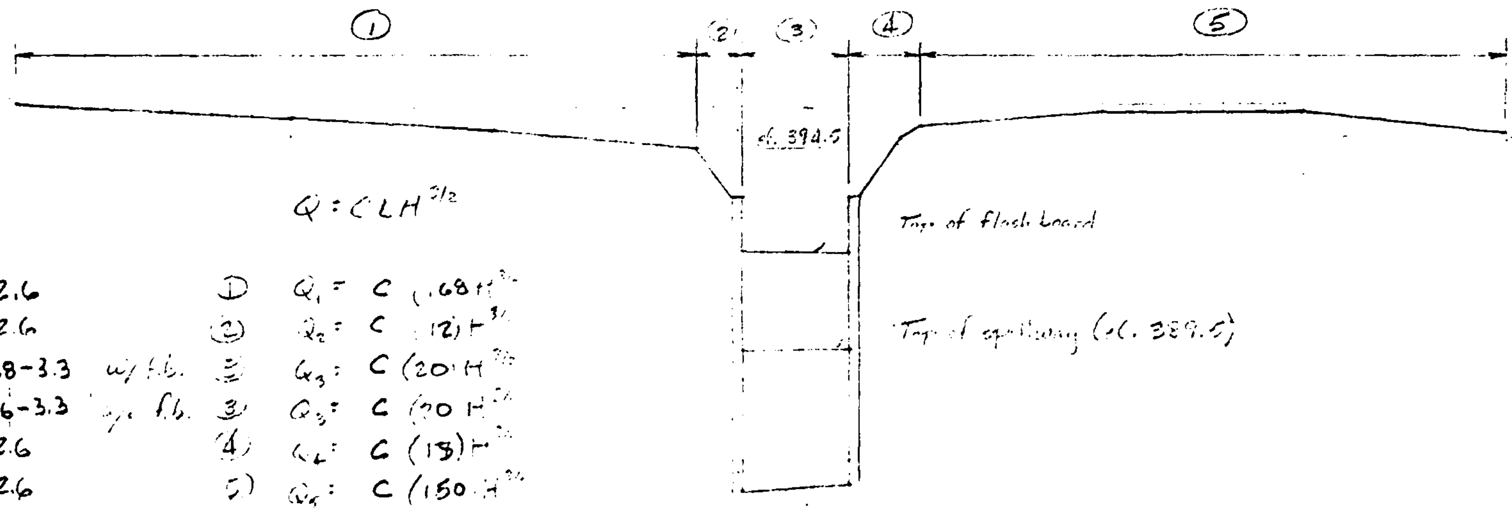
— [illegible] PMF

Vol. [illegible] = 506 ac-ft.

PROJ. NO. [illegible] 02
DESCRIPTION [illegible] POND DAM
WALLINGFORD, CT.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D[illegible] OF 18
BY TKC DATE 12/[illegible]
CHKD. BY WJG DATE 2/9/81



$Q = CLH^{3/2}$

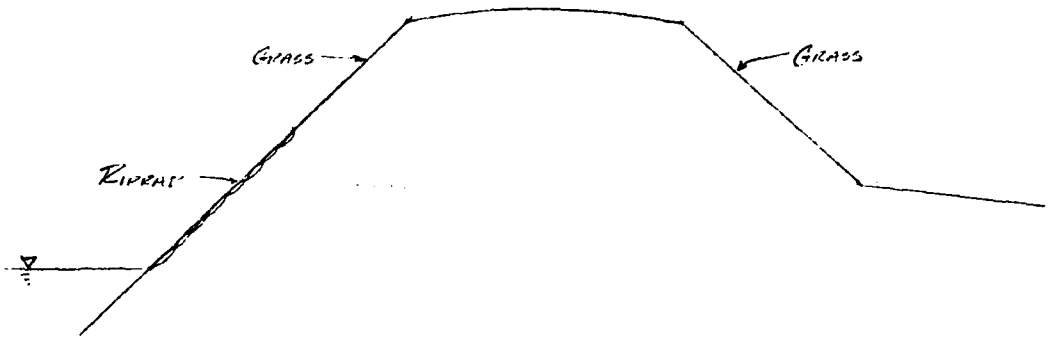
C = 2.6	(1)	$Q_1 = C\,(168)\,H^{3/2}$
C = 2.6	(2)	$Q_2 = C\,(12)\,H^{3/2}$
C = 2.8–3.3 w/ f.b.	(3)	$Q_3 = C\,(20)\,H$
C = 2.6–3.3 w/o f.b.	(3)	$Q_3 = C\,(20)\,H$
C = 2.6	(4)	$Q_4 = C\,(18)\,H$
C = 2.6	(5)	$Q_5 = C\,(150)\,H$

PROFILE LOOKING UPSTREAM
NTS

PROJ. NO. 8041.2
DESCRIPTION PISTAPAUG POND DAM, WALLINGFORD, CT.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D3 OF 18
BY TKC DATE 12/5/60
CHKD. BY WJG DATE 2/9/61



SECTION THROUGH PISTAPAUG POND DAM

SCALE: HOR. 1"=10'-0"
VERT. 1"=5'-0"

PROJ. NO. 3041.0
DESCRIPTION PISTAKEE POND DAM
WALLINGFORD, CT

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D4 OF 18
BY TEC DATE 12/10/81
CHKD. BY WJG DATE 2/9/81

PISTAKEE POND DAM

Using the weir formula, $Q = CLH^{3/2}$, discharge rating data can be calculated (see profile, sheet no. 2):

With Flash Board

ELEV.	H_1	H_2	H_3	H_4	H_5	Q_1	Q_2	Q_3	Q_4	Q_5	Q_{TOT}
391.9	-	-	-	-	-	-	-	-	-	-	0
392.9	-	-	1	-	-	-	-	66	-	-	66
393.5	-	0.6	2	0.6	-	-	15	187	22	-	224
394.3	-	1	3	1	-	-	31	313	47	-	421
395.9	0.5	2	4	2	0.8	312	88	528	132	279	1339

∴ SDF of 1125 cfs will occur @ elev. 395.8 MSL

With Flash Board

ELEV.	H_1	H_2	H_3	H_4	H_5	Q_1	Q_2	Q_3	Q_4	Q_5	Q_{TOT}
389.5	-	-	-	-	-	-	-	-	-	-	0
390.5	-	-	1	-	-	-	-	54	-	-	54
391.5	-	-	2	-	-	-	-	161	-	-	161
392.5	-	-	3	-	-	-	-	332	-	-	332
393.5	-	0.2	4	0.2	-	-	3	528	4	-	535
394.5	-	0.7	5	0.7			19	738	27		783
395.5	.5	1.2	6	1.2	.5	154	41	970	62	138	1365

∴ SDF of 1125 cfs will occur @ elev. 395.3 MSL

Outlet Works

$elev_{US} = 388.0$
$elev_{DS} = 372.0$

$Q_{24} = CA\sqrt{2gH}$

$3.14\,(8.02)(16)^{1/2} = 101$ cfs

$Q_{10} = 1.77\,(8.02)(16)^{1/2} = 57$ cfs

PROJ. NO. BDH102
DESCRIPTION Wintergreen Pond Dam
Wallingford, Conn.

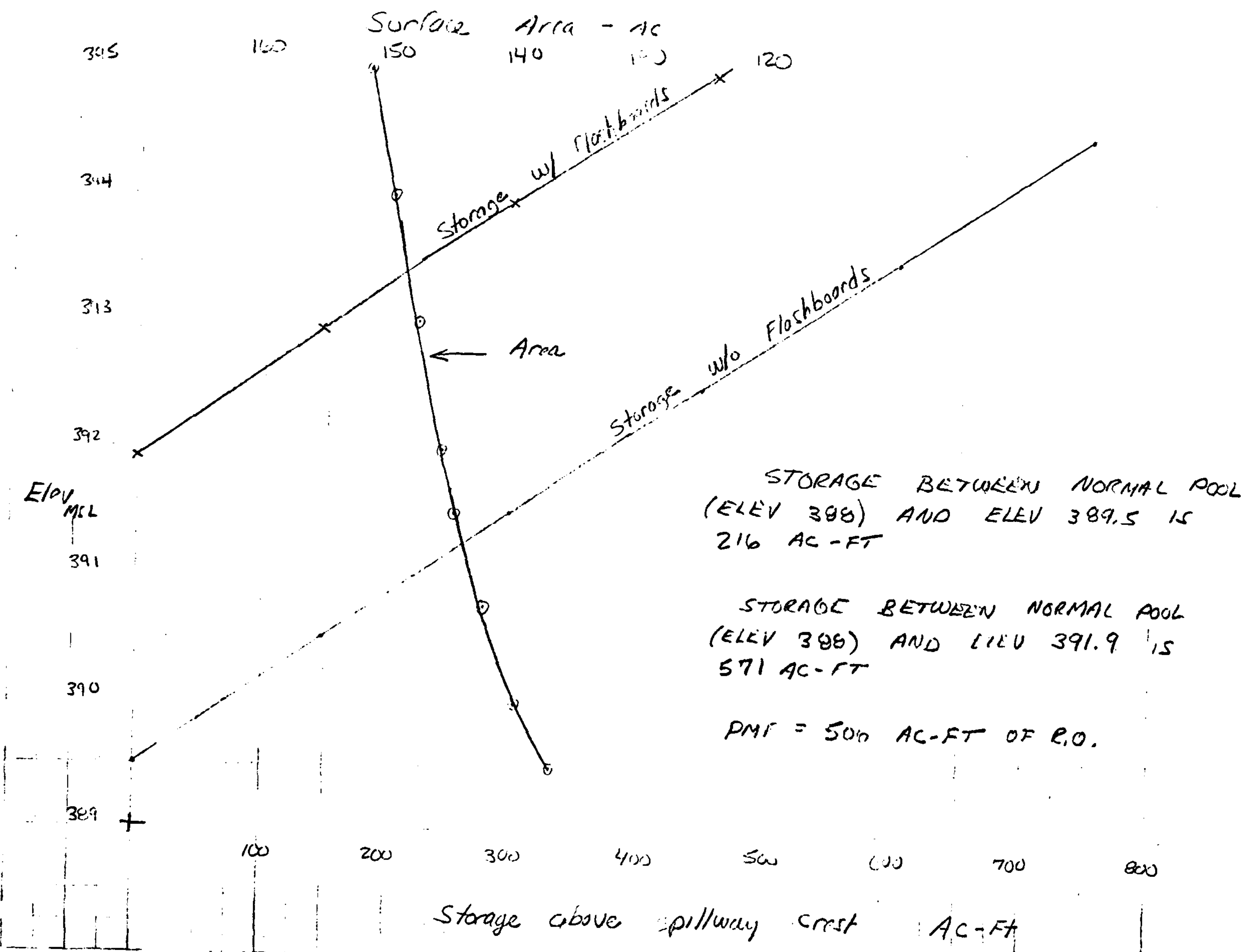
GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D5 OF 19
BY WJG DATE 2-9-81
CHKD. BY ______ DATE ______

STORAGE BETWEEN NORMAL POOL (ELEV 388) AND ELEV 389.5 IS 216 AC-FT

STORAGE BETWEEN NORMAL POOL (ELEV 388) AND ELEV 391.9 IS 571 AC-FT

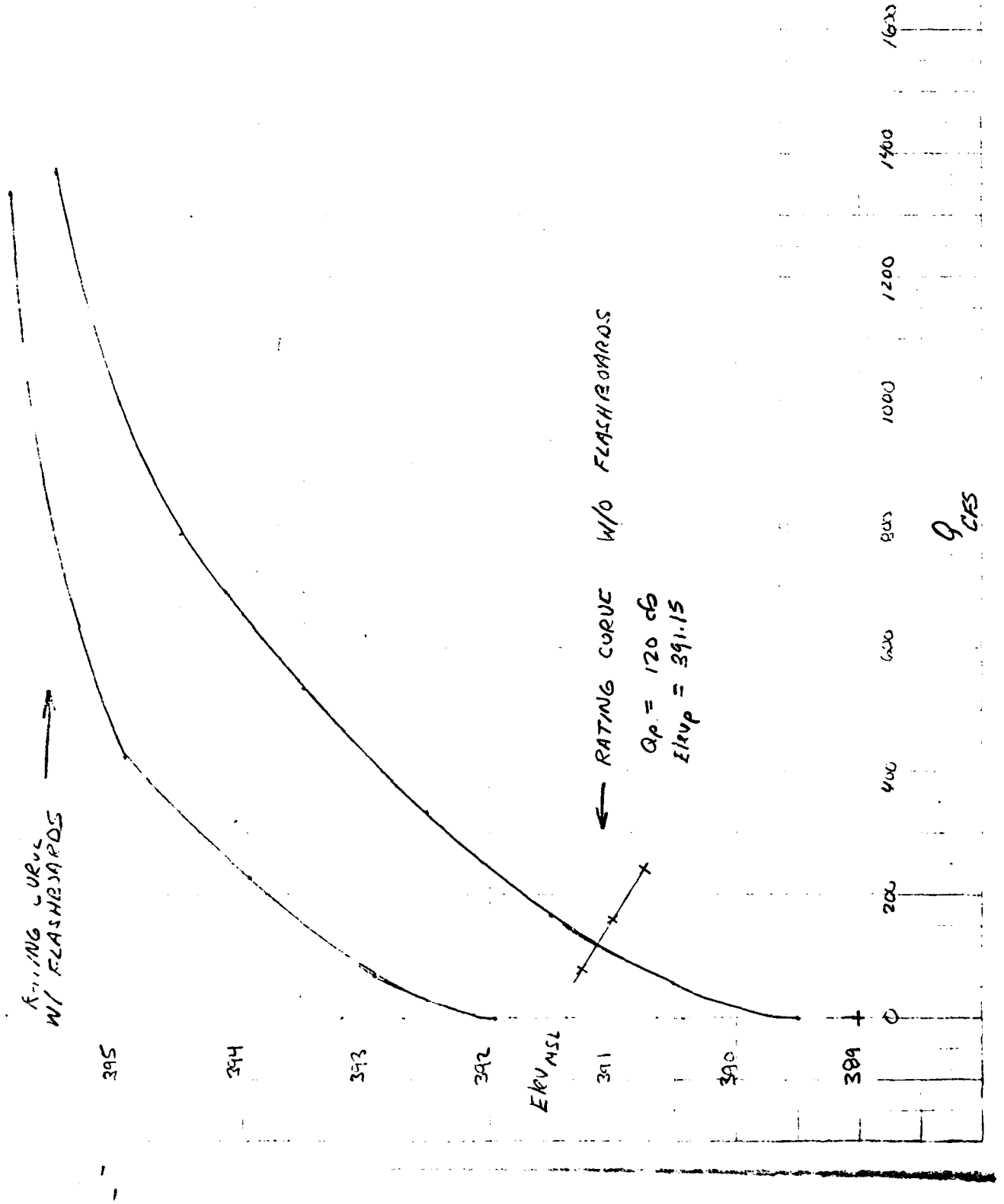
PMF = 500 AC-FT OF R.O.



PROJ. NO. 804102
DESCRIPTION Pistapaug Pond Dam I
Wallingford, Conn

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. 16 OF 19
BY WJG DATE 2-9-81
CHKD. BY _____ DATE _____



PROJ. NO. 804.02
DESCRIPTION Pistapaug Pond Dam, Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D7 OF 18
BY TKC DATE 12/10/..
CHKD. BY WJG DATE 2-9-81

PISTAPAUG POND DAM

Dam Breaching Analysis:

$$Q_{P_1} = 8/27\, W_b \sqrt{g}\, Y_o^{3/2}$$

$$Q_{P_1} = (8/27)(0.4)(320)(\sqrt{32.2})(9.2)^{3/2}$$

$$Q_{P_1} = 6005 \text{ cfs} \quad \text{(no additional spillway flow)}$$

d/s of dam

Section A-A (900' d/s of dam)

$Q_{P_1} = 6005$ cfs $Q_{P_0} = 325$ cfs (flashboards in)
$elev_1 = 372.5$ $elev_2 = 370.15$
$A_1 = 860$ ft² $A_2 = 110$ ft²

$$V_{12} = \frac{(900')(860 - 110)\text{ ft}^2}{43{,}560 \text{ ft}^2/\text{ac}}$$

$$V_{12} = 15.5 \text{ ac-ft.}$$

$$Q_{P_2} = Q_{P_1}\left(1 - V_{12}/S_1\right)$$

$$Q_{P_2} = 6005\left(1 - \frac{15.5}{4542}\right)$$

$Q_{P_2} = 5985$ cfs (trial)
$elev_2 = 372.5$, $A_2 = 860$ ft², $V_{12} = 15.5$ ac-ft

$$Q_{P_2} = 6005\left(1 - \frac{(15.5 + 15.5)/2}{4542}\right) = 5985$$

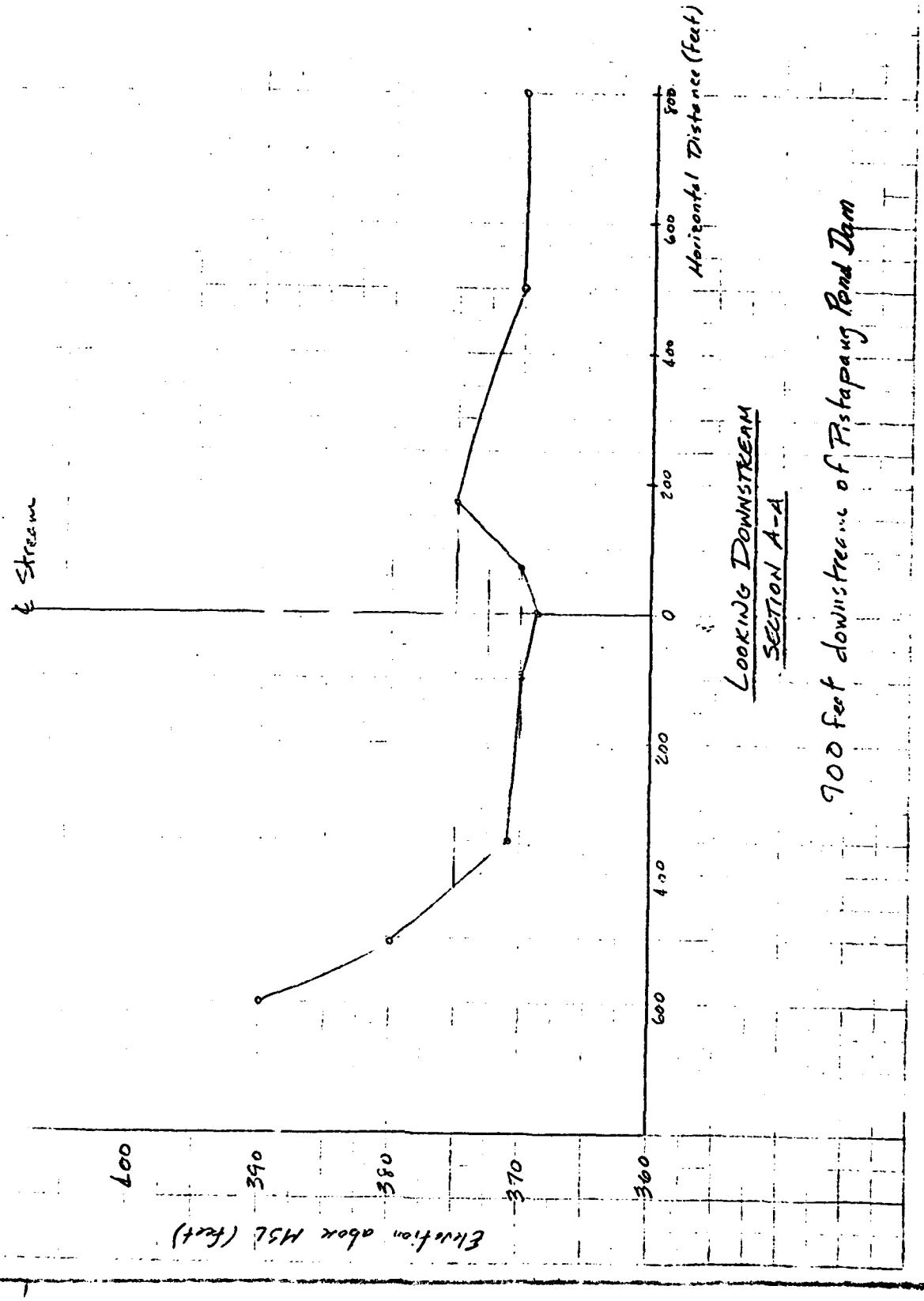
$Q_{P_2} = 5985$ cfs
$elev_2 = 372.5$

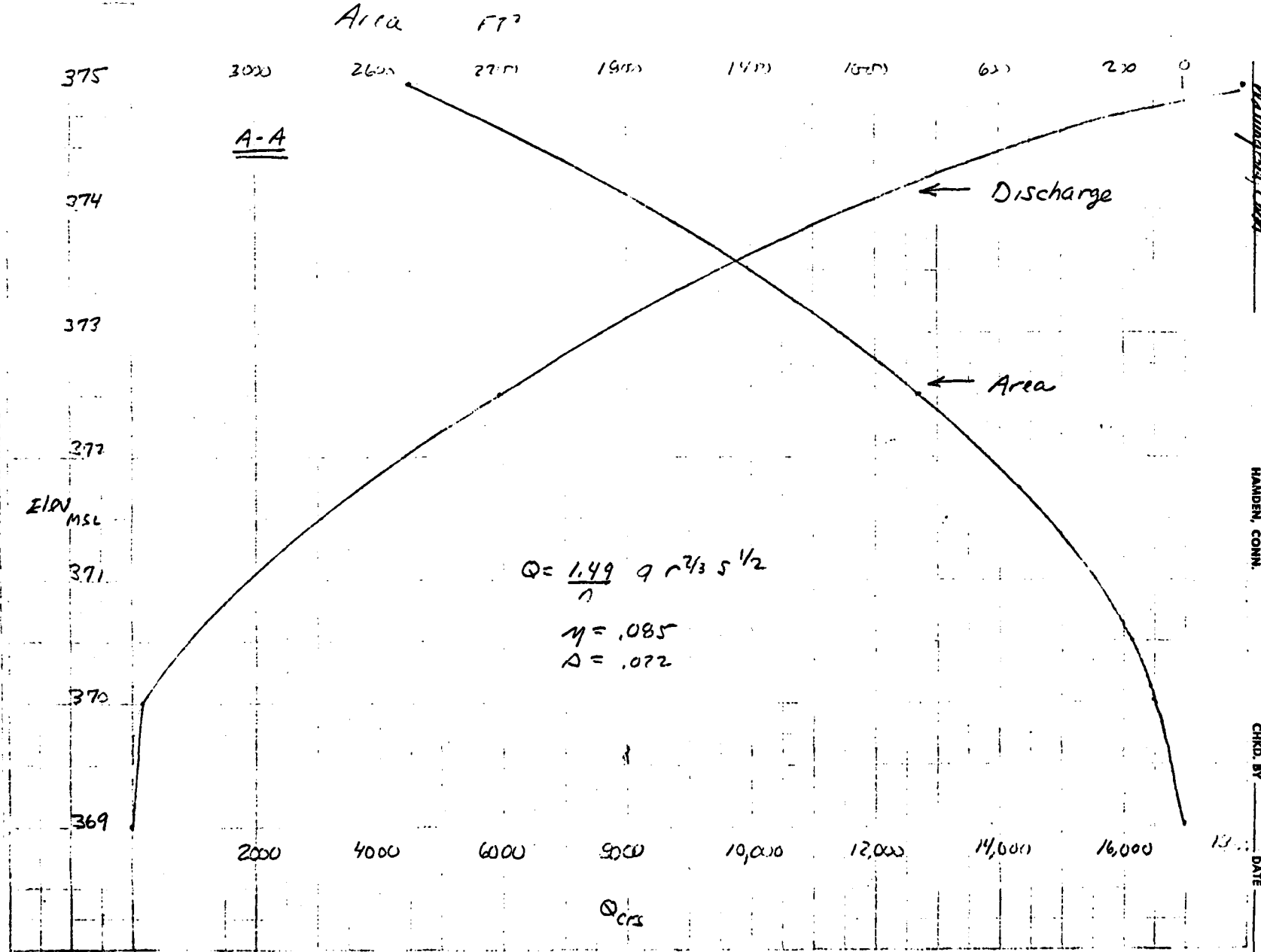
Move downstream to next section and repeat this process using $Q_{P_2} = 5985$ cfs

PROJ. NO. 504102
DESCRIPTION Pistapaug Pond Dam
Wallingford, CT

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D8 OF 18
BY TKL DATE 11/25/10
CHKD. BY ____ DATE ____





PROJ. NO. 80422
DESCRIPTION Discharge Rating Curve Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. 19 OF 19
BY WJG DATE 2/9/81
CHKD. BY _____ DATE _____

PISTAPAUG POND DAM

Dam Breaching Analysis (cont.):

section B-B (1400' d/s of A-A)

$Q_{P_2} = 5985$ cfs
$elev._2 = 345.3$
$A_2 = 1150$ ft²

$Q_{P_0} = 325$ cfs
$elev._0 = 341.2$
$A_0 = 55$ ft²

$$V_{23} = \frac{(1400)(1150 - 55)}{43,560}$$

$V_{23} = 35.2$ ac-ft

$$Q_{P_3} = 5985\left(1 - \frac{35.2}{4542}\right)$$

$Q_{P_3} = 5939$ cfs (trial)
$elev._3 = 345.3$, $A_3 = 1150$ ft², $V_{23} = 35.2$ ac-ft

$$Q_{P_3} = 5985\left(1 - \frac{35.2\,(2)/2}{4542}\right) =$$

$Q_{P_3} = 5939$ cfs
$elev._3 = 345.3$

section C-C (1400' d/s of B-B)

$Q_{P_3} = 5939$ cfs
$elev._3 = 316.8$
$A_3 = 875$ ft²

$Q_{P_0} = 325$ cfs
$elev._0 = 311.5$
$A_0 = 50$ ft²

$$V_{34} = \frac{(1400)(875 - 50)}{43,560}$$

$V_{34} = 26.5$ ac-ft

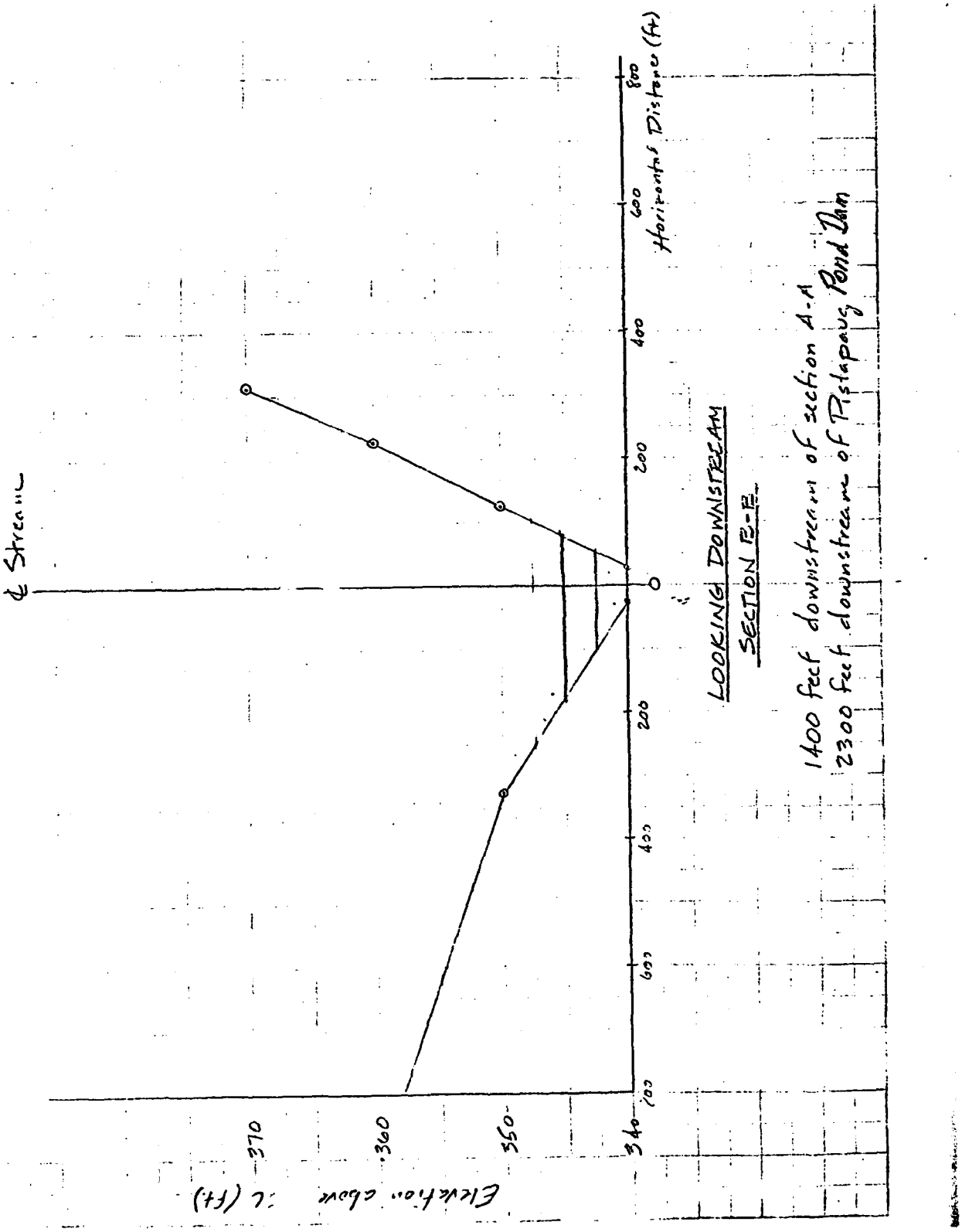
$$Q_{P_4} = 5939\left(1 - \frac{26.5}{4542}\right)$$

$Q_{P_4} = 5904$ cfs (trial)
$elev._4 = 316.8$, $A_4 = 875$ ft², $V = 26.5$ ac-ft

PROJ. NO. 204102
DESCRIPTION Kistaug Pond Dam
Wallingford, CT

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

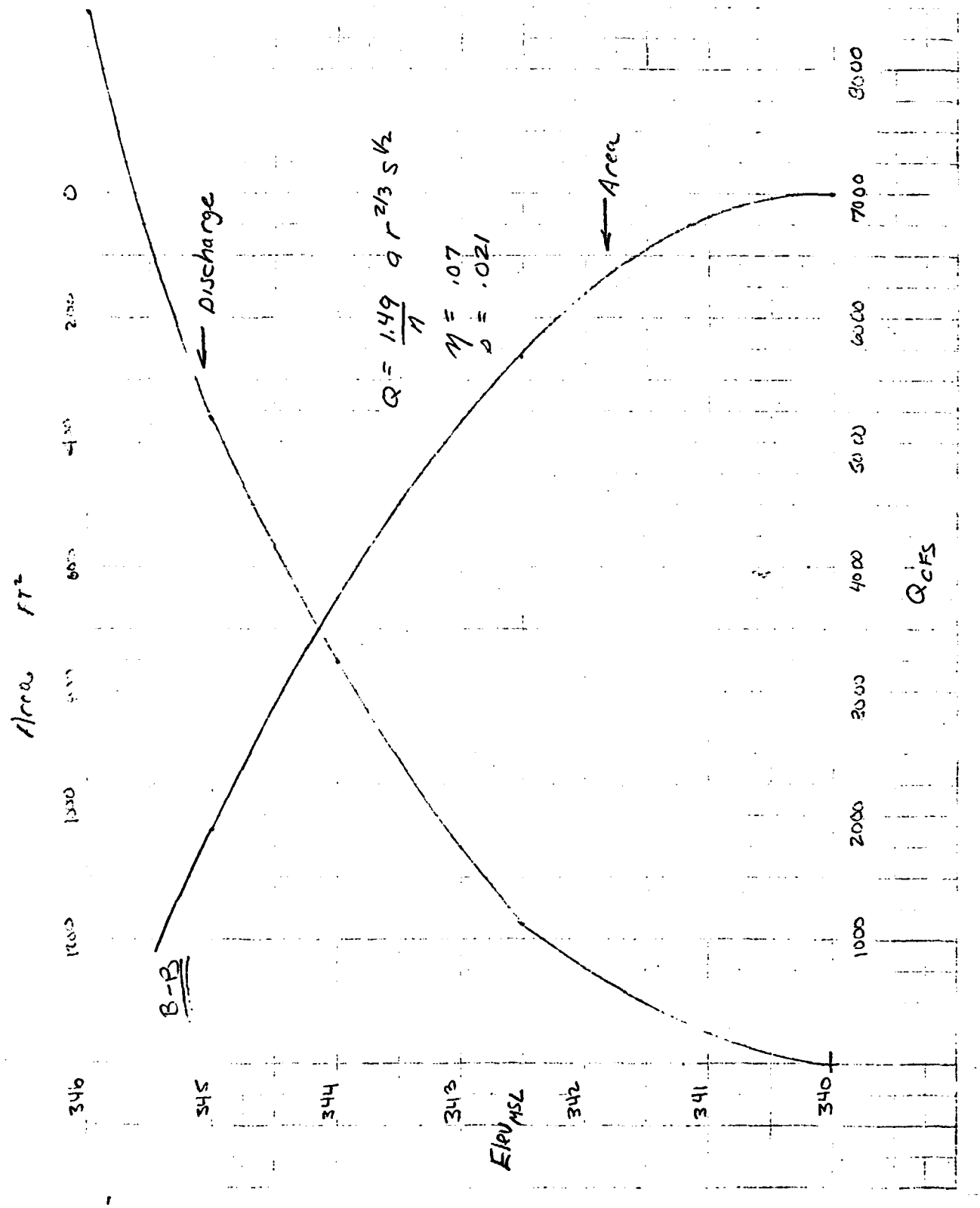
SHEET NO. D 11 - OF 78
BY TKC DATE 11/23/20
CHKD. BY _____ DATE _____



PROJ. NO. 804102
DESCRIPTION Pisgagus Road Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

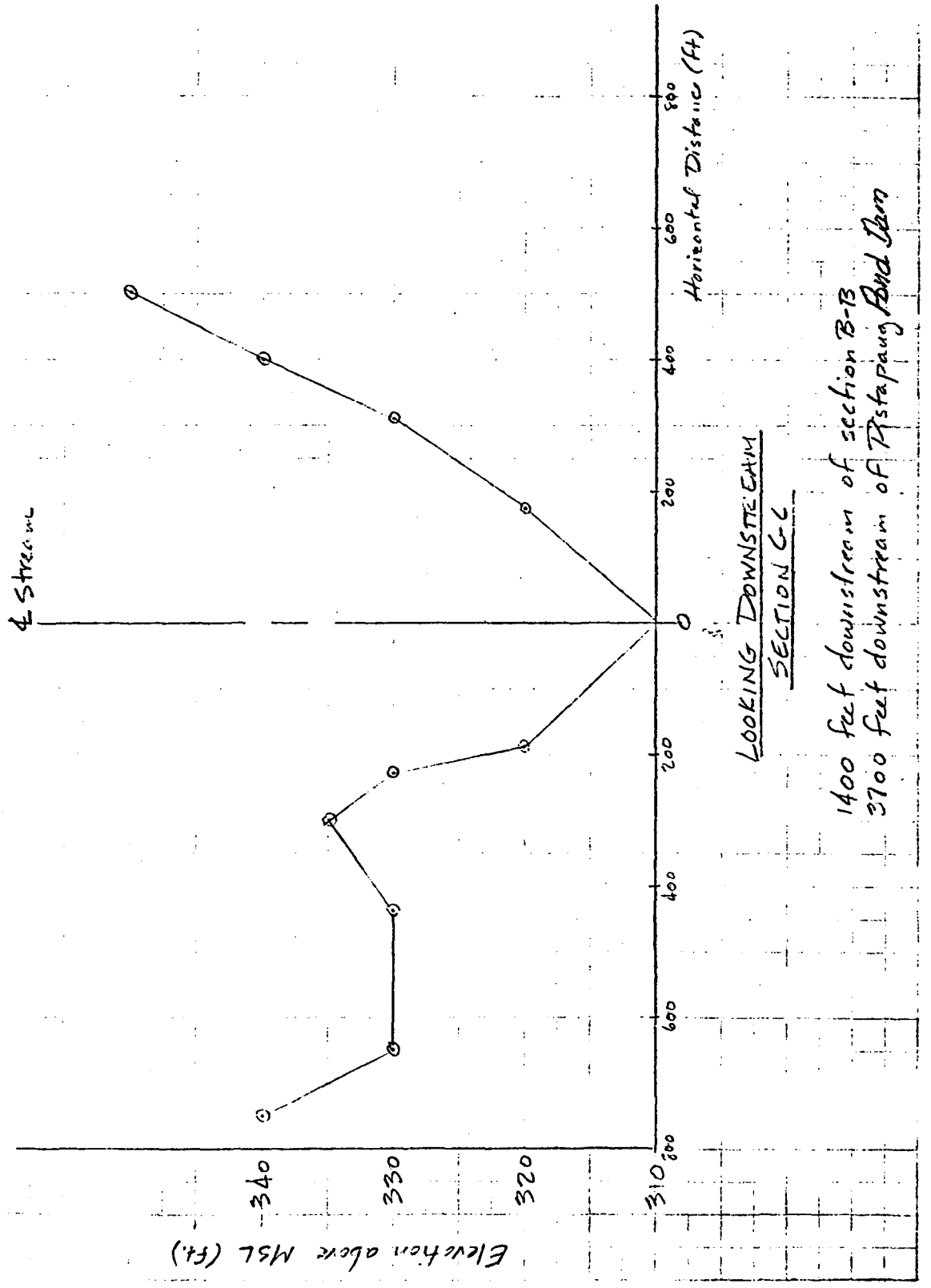
SHEET NO. D12 OF 18
BY WJG DATE 2/9/81
CHKD. BY _____ DATE _____



PROJ. NO. 8410
DESCRIPTION MIXING POND DAM WALLINGFORD, CT.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

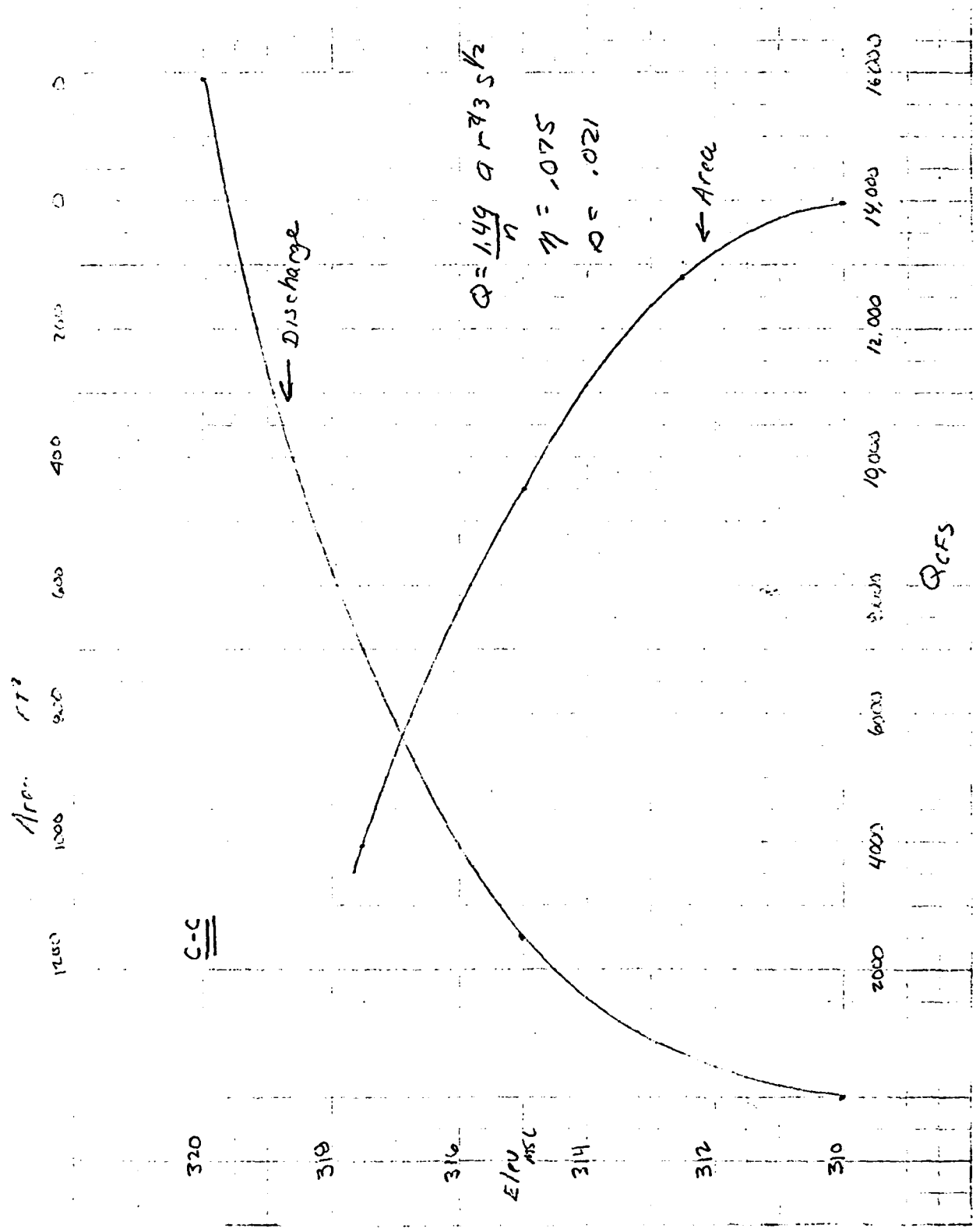
SHEET NO. 13 OF 18
BY TKC DATE 11/21/80
CHKD. BY WJG DATE 2/9/81



PROJ. NO. 804122
DESCRIPTION Hydraulic Analysis Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D14 OF 10
BY WJG DATE 2/9/01
CHKD. BY _____ DATE _____



PISTAUG POND DAM

Dam Breaching Analysis (cont.):

Q_{P2} = Same

$Q_{P4} = 5904$ cfs
$elev_4 = 316.8$

Section D-D (2550' d/s of C-C)

$Q_{P4} = 5904$ cfs
$elev_4 = 274.5$
$A_4 = 1010$ ft²

$Q_{P0} = 325$ cfs
$elev_0 = 271.0$
$A_0 = 80$ ft²

$$V_{45} = \frac{(2550)(1010 - 80)}{43,560}$$

$V_{45} = 54.4$ ac-ft

$$Q_{P5} = 5904\left(1 - \frac{54.4}{4542}\right)$$

$Q_{P5} = 5833$ cfs (trial)
$elev_5 = 274.5$, $A_5 = 1010$, $V_{45} = 54.4$ ac-ft

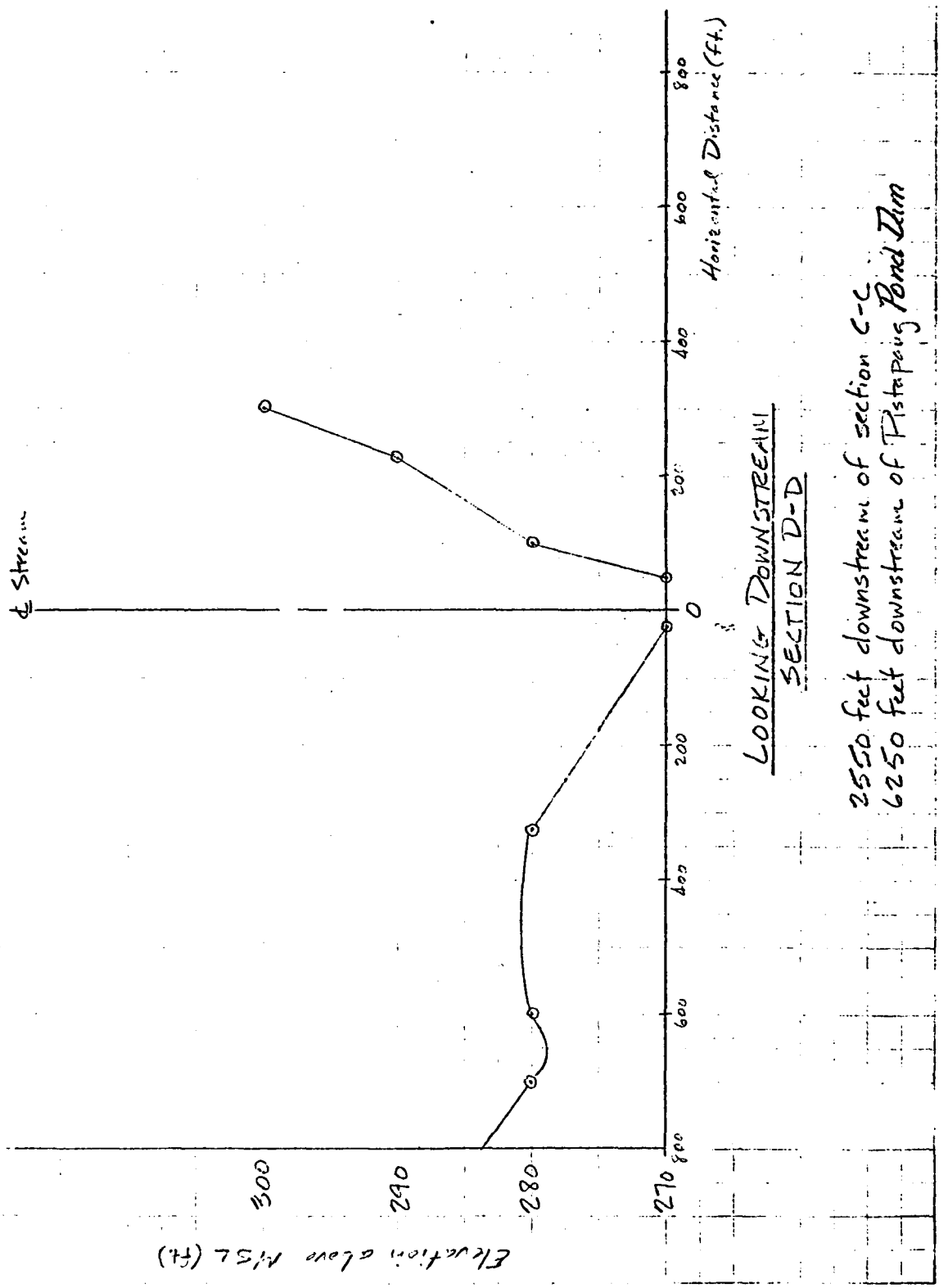
Q_{P5} = Same

$Q_{P5} = 5833$ cfs
$elev_5 = 274.5$

PROJ. NO. 5.612
DESCRIPTION Pistapaug Pond Dam
Wallingford, CT

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

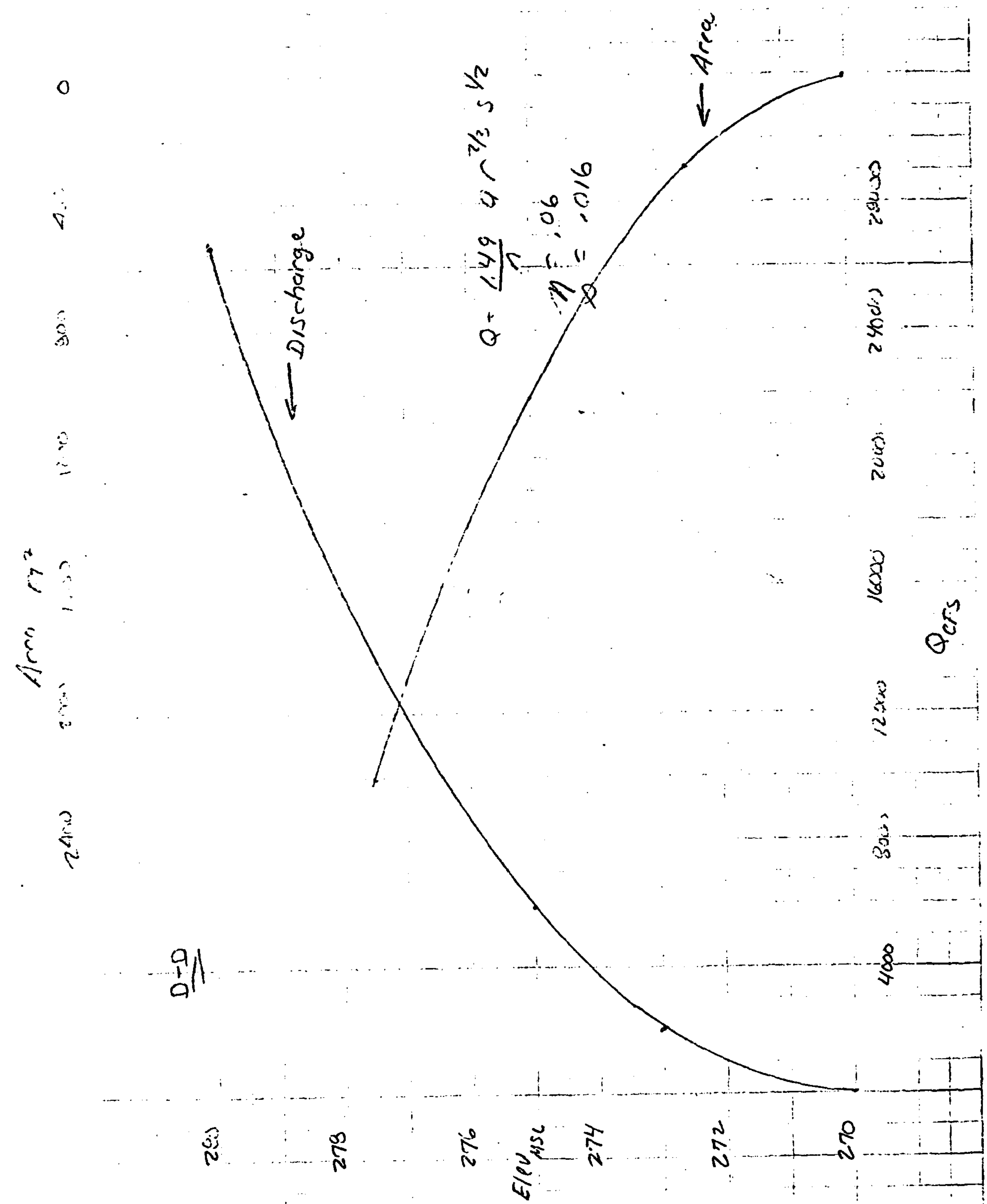
SHEET NO. D-16 OF 18
BY TKC DATE 11/2, 1-2
CHKD. BY WJG DATE 2/9/61



PROJ. NO. 80H102
DESCRIPTION Pistapaug Pond Dam
Wallingford, Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. D 17 OF 19
BY WJG DATE 2/9/81
CHKD. BY ______ DATE ______



PROJ. NO. X04102
DESCRIPTION Pistapaug Pond Dam Wallingford Conn.

GENOVESE AND ASSOCIATES
CONSULTING ENGINEERS
HAMDEN, CONN.

SHEET NO. V-18 OF 18
BY TKG DATE 12/12/80
CHKD. BY WJB DATE 2/9/81

PISTAPAUG POND DAM

Summary of Breach Analysis;

STA.	Q	ELEV	DEPTH	VEL
Dam	6005 cfs	391.4	6.1'	14.1 FPS
9+00	5985 cfs	372.5	3.5'	7.0 FPS
23+00	5939 cfs	345.3	5.3'	5.2 FPS
37+00	5904 cfs	316.8	6.8'	6.8 FPS
62+50	5833 cfs	274.5	4.5	5.8 FPS

Conclusions:

From section C-C to section D-D there are at least two houses that could be affected by the flood level. As the flood wave reaches Rte. 17 (at section D-D) it would begin to pond up behind the 6'x10' box culvert there. When this happens, 2-3 houses on the north side of Rte. 17 would have ≈ 3 feet of water. Therefore, the original hazard potential classification of HIGH should remain as a HIGH hazard potential.

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

NOT AVAILABLE AT THIS TIME

END

DATE
FILMED
10-84

DTIC